

# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

## CHAPTER 5

### FOREST RESOURCES

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# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

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### FOREST RESOURCES

#### SECTION 1: INTRODUCTION

##### 5100. PURPOSE

1. The heavily forested lands of Marine Corps Base Quantico (MCB) are a unique and integral component of the military training environment. The diverse forest structure affords a variety of vegetative covers and landscapes, which provide vast flexibility for the development of assorted military training scenarios and exercises. To ensure that this valuable training resource remains functional requires an aggressive forest management program directed at the improvement and maintenance of forest health and diversity through regularly scheduled silvicultural treatments.
2. The purpose of this chapter is to provide long-range guidelines for management of the forest resource at MCB. This chapter will provide a brief assessment of resources, management concepts and operational goals for the restoration, protection, scenic enhancement, and sustained beneficial use of the forest resource.

##### 5101. REQUIREMENTS AND AUTHORIZATION

1. Forest resource management is mandated on Department of Defense lands by DoD Directive Number 4700.4. This Directive states, "DoD forest lands shall be managed for sustained yield of quality forest products, watershed protection, wildlife habitat, and other uses that can be made compatible with mission activities."
2. This Directive further states, "forest products shall not be given away, abandoned, carelessly destroyed, used to offset costs of contracts, or traded for products, supplies, or services."
3. Additional forest resource management guidance is provided in Chapter 11 of Marine Corps Order P5090.2A.
4. Specific details for management of the forest resource at MCB will be outlined in this Chapter. Additional policy guidance is also established in Marine Corps Base Order (MCBO) 11015.1A "Woodland Tree and Shrub Removal".

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5102. FOREST MANAGEMENT OBJECTIVES. This chapter will identify strategies, guidelines, and procedures for accomplishment of the following forest management objectives.

1. To maintain and improve forest health, to ensure a quality environment for the military training mission at MCB.
2. To manage MCB forest lands for a sustained yield of forest products on those areas where it is compatible with military training.
3. To implement silvicultural practices that provide for diversity of forest tree species and other associated flora and fauna species, and maintain environmental integrity of forest ecosystems.
4. To provide for the management and control of wildfires and prescribed burning on all forest and range lands.
5. To identify, evaluate, monitor, and control (when required) forest insect and disease incidence using an integrated pest management approach (IPM).
6. To implement forest management actions that complement other multiple use requirements such as fish and wildlife, recreation, and various land use and base support requirements.

## 5103. FOREST MANAGEMENT HISTORY

1. The forest management program was started at Marine Corps Base, Quantico in 1962. Over the years this program has continued to evolve and become more complex, due to changes in traditional forest management practices, new technologies, increased environmental restrictions at the local, State, and Federal levels, increased public involvement, and more intensive utilization of the forest resource for military training.
2. Forest management at MCB today involves the challenge of maintaining vigorous, healthy, and sustainable forest ecosystems through the implementation of sound, scientifically proven silvicultural practices. These practices are designed to ensure biodiversity and the sustainability of all affected natural resources, maintain environmental integrity and favorable public perception, and provide a quality and diverse environment that fulfills the requirements for military training.

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### FOREST RESOURCES

#### SECTION 2: FOREST RESOURCE DESCRIPTION

##### 5200. GENERAL

1. Marine Corps Base Quantico owns and utilizes 58,995 acres for military training.
2. Most of the developed area at MCB is on the portion of the Base east of Interstate 95 known as the "Mainside" area, and contains about 7,900 acres. The area west of Interstate 95 is known as the "Guadalcanal" area and contains approximately 51,100 acres. This area is used intensively for all types of military training done by MCB to prepare officers for combat readiness. All live firing ranges and dud ordnance areas are located on this portion of the Base. Commercial sustained yield forest management is practiced on much of the Guadalcanal area. Of the total 58,995 acres owned by MCB, approximately 52,090 (88%) are forested.

##### 5201. FOREST COVER TYPES

1. For forest management purposes, trees are identified by the groups or mixtures of tree species that commonly grow together within the forest. These mixtures, or species associations, have been classified by the Society of American Foresters (SAF), and are referred to as "SAF forest cover types" (Eyre 1980). Cover types have been established for the entire United States and Canada. From the forest inventory conducted on the Base in 1989-1991, 20 forest cover types were identified (Table 5-1). The last three types listed in this table (115-117) are not official SAF forest cover types, but are utilized as such, to keep track of these three unique species.
2. Tree species occur naturally in various forest cover types because of various environmental factors such as climate, soils, moisture availability, geographical location, natural selection, and natural succession. It is important to recognize the factors contributing to their existence on a particular site in order to manage them effectively. Although individual species requirements are evaluated by the forester, management practices are directed at the forest cover type.

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TABLE 5-1. SAF FOREST COVER TYPE ACREAGES AT MCB.

SAF COVER TYPE	COMMON NAME	# OF STANDS	ACRES
16	Aspen	1	13
23	Eastern Hemlock	1	25
44	Chestnut Oak	12	370
52	White-Black-N.Red Oak(NRO)	209	9,072
53	White Oak (WO)	13	349
57	Yellow Poplar (YP)	44	924
58	Yellow Poplar-Hemlock	2	35
59	Yellow Poplar-WO-NRO	548	18,933
61	River Birch-Sycamore	2	59
65	Pin Oak-Sweetgum	7	378
75	Shortleaf Pine	2	77
78	Virginia Pine-Oak	336	8,658
79	Virginia Pine	329	8,512
81	Loblolly Pine	191	2,823
82	Loblolly Pine-Hdwd	12	189
87	Sweetgum-Yellow Poplar	32	1,065
92	Sweetgum-Willow Oak	4	90
93	Green Ash	1	23
94	Sycamore-Sweetgum-Elm	4	78
108	Red Maple	16	408
115	American Chestnut	1	1
116	Paulownia	1	2
117	Table Mountain Pine	2	6
TOTAL		1770	52,090

5202. FOREST VOLUMES. Forest volumes refer to the amount of cubic feet of pulpwood and board feet of sawtimber that are contained in the total forested areas of the base. This information was calculated from the Forestry data base, obtained during the 1989-1991 forest inventory. This data is presumably accurate within  $\pm 15\%$ , considering the inventory methods utilized. The total board foot volume of both pine and hardwood sawtimber is estimated to be 265,533,379 board feet. The total cubic foot volume of pine pulpwood is estimated to be 135,619 cords. Hardwood cubic foot volume is estimated at 158,590 cords. Table 5-2 (below) shows the calculated total forest timber volumes. Compartments containing hazardous ordnance and duds were excluded from these totals, because timber volume inventories could not be conducted in these areas.



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While these volume calculations are now dated, they are not expected to have changed significantly. Proper forest resource management will normally maintain consistent inventory volume levels. Reductions in sawtimber volumes harvested are usually offset by increased growth rates in areas that are thinned or regenerated to fully stocked stands. Since the annual allowable harvest acreage has not been exceeded during this period, the primary factors that might contribute to reductions in Base timber volumes would be the loss of land area to development or conversion to other non-forest uses.

TABLE 5-2. ESTIMATE OF FOREST VOLUMES AND VALUE FOR MCB			
	PULPWOOD (CDS)		SAWTIMBER (BD FT)
	<u>Pine</u>	<u>Hardwood</u>	<u>Pine and Hardwood</u>
Volume	135,619	158,590	265,533,379
Unit Price	\$20/cd	\$6/cd	\$120/thou bd ft
Unit Value	\$2,712,380	\$951,540	\$31,864,005
Total Value	\$2,712,380 + \$951,540 + \$31,864,005 = \$35,527,925		

### 5203. FOREST VALUE

1. The importance of the forest resource for meeting the military training requirements at MCB would be difficult to assess in terms of monetary value. The significance of this invaluable element was discussed in paragraph 5100. The forest provides additional important benefits that are equally as difficult to appraise. These include all types of recreation, various species of flora and fauna, and the visually appealing aspects of the forest.

2. The forest is also extremely valuable as a renewable natural resource. It can provide a sustained yield of forest products indefinitely when managed appropriately. These products provide essential items on which society is dependent, and employment throughout the forest industry including logging, forest product manufacturing, retail product sales, and construction. While the value of all employment associated with the production of forest products could be assessed with some difficulty, the total value of the standing forest inventory is more easily determined. Using the forest volume calculations from paragraph 5202 above, and

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a conservative market value, Table 5-2 shows that the value for the inventory of forest products at MCB is estimated to be \$35,527,925.

3. It is important to realize the economic value of the forest from the aspect of the benefits that are derived from the sale and manufacturing of forest products. Considering the commodities provided, the employment generated, and the total monetary value of these benefits, it would be a vital loss if this valuable renewable resource was not managed for a sustained yield of forest products. At MCB the sale of forest products pays for most forest management costs, which provides for the maintenance of a healthy forest and quality training environment.

### 5204. REFERENCES

Eyre, F. H., Ed., 1980. Forest Cover Types of the United States and Canada. Society of American Foresters. 148 pp.

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### FOREST RESOURCES

#### SECTION 3: FOREST REGULATION

5300. FOREST COMPARTMENT DESIGNATION. For forest management purposes, the total Base area at MCB has been divided into 79 administrative management units called "forest compartments". Forest compartment boundaries are designed to coincide with roads, streams and other identifiable ground features. Compartment boundaries also coincide with the 35 operational military Training Area boundaries, although several compartments may be contained within a single Training Area. Figure 5-1 shows the location and designation of forest compartments. All planning and forest management actions are executed at the compartment level.

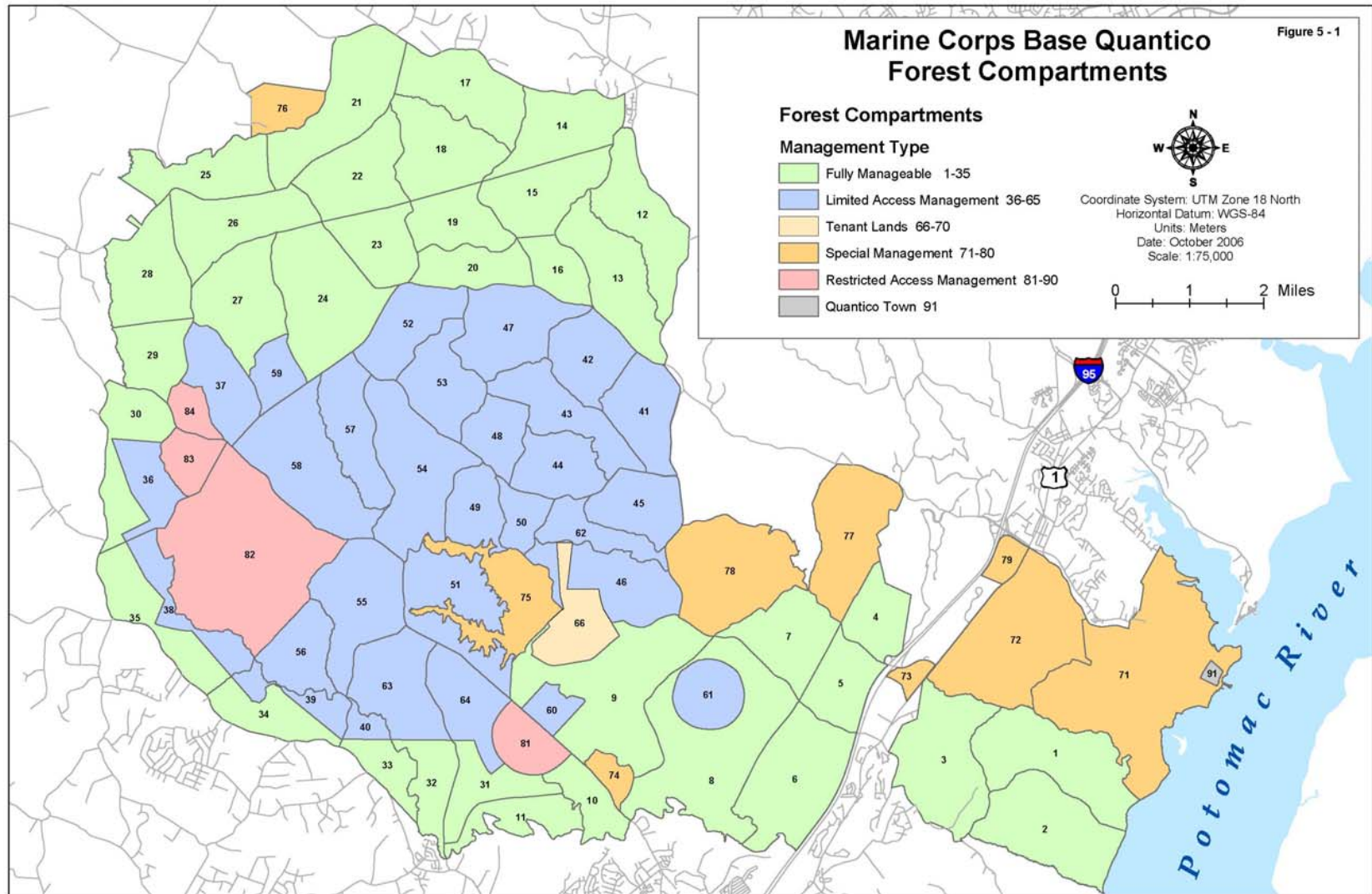
5301. FOREST MANAGEMENT ZONES. Forest compartment boundaries reflect all land ownership and tenant leased lands within the confines of MCB. These interests, along with current military land use requirements, determine largely the extent and intensity of forest management operations. Accordingly, 5 forest management zones have been established at MCB. The map in Figure 5-1 shows the various compartments in each forest management zone. Table 5-3 shows the total acres and forested acres by compartment for each management zone. Management objectives for each forest management zone are described below.

1. Forest Management Zone 1. This zone is determined to be a commercial forest management area, in which multiple use sustained yield timber management will be the objective. Commercial forest management is compatible with military and other land use requirements in this zone. The current age class distributions (2006 data) for pine, hardwood, and mixed pine/hardwood forest types within this zone are shown in Figures 5-2, 5-3, and 5-4. These figures also depict the ideal (balanced) age class distributions that would be achieved under sustained yield forest management. Further analysis of these age class distributions and their implications for forest management will be discussed in paragraphs 5304-5306. These paragraphs will also establish the requirements and guidelines for sustained yield forest management in this zone, and variations utilized in other zones.

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TABLE 5-3. FOREST MANAGEMENT ZONES				
(ZONE 1) FULLY MANAGEABLE (1-35)				
FOREST COMPARTMENT	TOTAL ACRES	FORESTED ACRES	OPEN	WATER
1	1225	643	103	479
2	1161	1132	30	0
3	1211	1084	78	50
4	481	437	45	0
5	559	555	2	2
6	1211	1101	14	95
7	759	658	102	0
8	1832	1783	49	0
9	1731	1531	200	0
10	389	356	33	0
11	459	459	0	0
12	921	899	22	0
13	947	945	2	0
14	785	709	76	0
15	770	765	5	0
16	381	377	4	0
17	877	833	44	0
18	892	873	19	0
19	572	562	10	0
20	525	522	3	0
21	1148	1085	64	0
22	822	791	31	0
23	605	602	3	0
24	1321	1237	84	0
25	745	607	136	1
26	878	757	118	3
27	927	810	117	0
28	883	810	73	0
29	505	494	10	0
30	692	667	8	16
31	505	481	24	0
32	441	438	3	0
33	335	331	4	0
34	497	496	1	0
35	698	697	1	0
<b>TOTAL (ZONE 1)</b>	<b>28,690</b>	<b>26,526</b>	<b>1,518</b>	<b>646</b>

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TABLE 5-3. FOREST MANAGEMENT ZONES (CONTINUED)				
(ZONE 2) LIMITED ACCESS MANAGEMENT (36-65)				
FOREST COMPARTMENT	TOTAL ACRES	FORESTED ACRES	OPEN	WATER
36	431	425	6	0
37	656	352	304	0
38	462	443	20	0
39	326	295	25	7
40	132	132	0	0
41	695	665	31	0
42	642	564	74	3
43	749	746	4	0
44	579	578	1	0
45	418	407	0	11
46	829	569	260	0
47	908	902	6	0
48	443	438	5	0
49	467	463	4	0
50	290	288	2	0
51	968	952	16	0
52	686	671	15	0
53	689	681	8	0
54	1270	1253	18	0
55	1014	896	113	4
56	528	376	152	0
57	718	717	1	0
58	1224	1172	53	0
59	305	238	67	0
60	193	163	30	0
61	463	417	47	0
62	615	613	3	0
63	871	856	15	0
64	640	<u>618</u>	<u>22</u>	<u>0</u>
<b>TOTAL (ZONE 2)</b>	<b>18,213</b>	<b>16,887</b>	<b>1,301</b>	<b>25</b>



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TABLE 5-3. FOREST MANAGEMENT ZONES (CONTINUED)				
(ZONE 3) TENANT LANDS (66-70)				
FOREST COMPARTMENT	TOTAL ACRES	FORESTED ACRES	OPEN	WATER
66	<u>555</u>	<u>330</u>	<u>222</u>	<u>3</u>
<b>TOTAL (ZONE 3)</b>	<b>555</b>	<b>330</b>	<b>222</b>	<b>3</b>
(ZONE 4) SPECIAL MANAGEMENT (71-80)				
71	2580	1399	1110	71
72	1639	1240	323	75
73	101	76	25	0
74	168	85	82	1
75	817	267	67	483
76	336	239	97	0
77	1024	1023	0	0
78	1314	1267	0	47
79	<u>141</u>	<u>107</u>	<u>34</u>	<u>0</u>
<b>TOTAL (ZONE 4)</b>	<b>8,120</b>	<b>5,703</b>	<b>1,739</b>	<b>678</b>
(ZONE 5) RESTRICTED ACCESS MANAGEMENT (81-90)				
81	405	351	54	0
82	2501	1965	536	0
83	318	151	168	0
84	<u>192</u>	<u>178</u>	<u>14</u>	<u>0</u>
<b>TOTAL (ZONE 5)</b>	<b>3,416</b>	<b>2,645</b>	<b>772</b>	<b>0</b>
(ZONE 6) QUANTICO TOWN (91)				
91	<u>0</u>	<u>0</u>	<u>37.01</u>	<u>0</u>
<b>TOTAL (ZONE 6)</b>	<b>0</b>	<b>0</b>	<b>37.01</b>	<b>0</b>

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### 2. Forest Management Zone 2

a. Forest management actions will be minimal in this zone due to the presence and frequent use of live firing ranges. The firing ranges do not produce hazardous ordnance, but the distance the projectiles extend prohibits access to these areas when ranges are active. Portions of a few compartments within this zone are somewhat accessible. Most of the area, however, is rarely accessible.

b. Forest management objectives for this zone are to accomplish some dispersed harvesting and prescribed burning to improve forest health conditions, species diversity and wildlife habitat, and to reduce wildfire hazard potential. Additional management objectives include forest insect and disease management and the establishment and maintenance of old growth and other unique forest ecosystems.

c. Figures 5-5, 5-6, and 5-7 show the current age classes (2006 data) for pine, hardwood, and mixed pine/hardwood forest types within this zone. The ideal (balanced) age class distributions that would be achieved under sustained yield forest management are shown only to illustrate the deviation of these unmanaged stands from managed stands. Figures 5-5, 5-6, and 5-7 also show that higher levels of harvesting were prevalent in this zone in the past, as evidenced by the amount of acreages in the 11-20, 21-30 and 31-40 age classes.

The acreages are slightly overstated in Figures 5-5, 5-6, and 5-7 within the 0-10 age class. Most of the acreages in this age class represent forest stands for which no data was collected during the forest inventory due to access restrictions. Where no data was available, "0" was entered for age. In actuality, little harvesting has been done within this area within the past 15 years, due to increased military training activities on ranges.

d. In the future, low-level timber harvesting in Zone 2 is expected to have an overall negligible effect on age class distributions. Other short and long term consequences of the lack of timber harvesting in this zone are readily predictable. These are briefly described below:

- Age class distributions (refer to Figures 5-5, 5-6, and 5-7) will basically remain the same, but shift right toward much older age classes. Due to the lack of timber harvesting, regeneration will occur mainly through natural mortality (which creates small openings), and understory regeneration of shade tolerant species. Additional factors that could also contribute to regeneration include wind, ice, insects, diseases, and wildfires.

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- Natural succession processes will enable the more shade tolerant hardwoods to replace old Virginia pine in both pure and mixed pine/hardwood stands. Planted loblolly pine in this zone will persist for an extended period, as it is considerably longer lived. Eventually, it will also be replaced by hardwood. Shade tolerant hardwoods such as beech and maple, will be the principal species regenerating, and over the long term, will replace existing stands of oak/hickory forests.
- While a complete transformation of all species to a beech-maple forest in this zone might require 150-200 years, the transition of pure pine and mixed pine/hardwood forest types to more shade tolerant hardwood types is proceeding more rapidly, as large acreages of old Virginia pine are dying and being replaced.
- As Virginia pine stands grow beyond maturity, they will become more susceptible to attack by insects and diseases. Due to the absence of timber harvesting and removal of dead wood through firewood cutting, fuels on the forest floor will build up to levels which create hazardous conditions for wildfires.

e. The consequences of the lack of timber harvesting in Forest Management Zone 2 are mostly negative from a forest health viewpoint, however, unique management opportunities for the establishment of old growth forests, natural areas, and other diverse forest ecosystems are available. Additional diversification of age classes and forest species structure within this zone is desirable to reduce the likelihood of large-scale natural disasters. Given the access constraints for timber harvesting, prescribed burning (which can be done in one day in most cases) may be the most effective tool for accomplishing vegetative manipulation for wildlife enhancement, fuel reduction, and maintenance of unique ecosystems.

3. Forest Management Zone 3. The compartments in this zone contain relatively small acreages. Forest management objectives will be compatible with tenant organization requirements. The major objective in this zone will be to maintain healthy and visually appealing forested areas. This will be accomplished primarily through the application of thinnings and selective harvesting.

4. Forest Management Zone 4. The compartments in this zone have development, water bodies, recreational areas, and other features or uses which require special management considerations. Compartments 76, 77, and 78, have unique considerations, but are more available for forest management harvesting. The remaining compartments in this

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Zone offer little opportunity for harvesting. Forest pest management is of utmost importance in Zone 4, because of the requirements to protect forested landscapes for recreation, watersheds and reservoirs, and developed areas.

5. Forest Management Zone 5. This zone includes live firing ranges containing ordnance and duds, and is consequently restricted. Forest management activities in this zone will be directed at annual prescribed burning on firing ranges, and in surrounding training areas to reduce fire occurrence and severity. Pest management related problems in this zone will be evaluated to determine options, and compatible treatment solutions enacted, as required.

### 5302. FOREST INVENTORY AND MAPPING

1. Effective management of the Base forest resource requires an accurate inventory of forested areas. A forest inventory of the entire Base area was completed during 1989-1991. Forested areas were mapped from aerial photography using the Society of American Foresters (SAF) cover types (see Paragraph 5201), and stored in a Geographic Information System (GIS) computer. Additional land classifications such as bodies of water, and developed and open areas were also mapped at this time. Numerous field information for each forest type was also recorded and compiled in a computer database, which can be directly correlated with the graphical GIS cover type mapping. This information provides the forest manager with the ability to assess conditions of individual forest stands and entire forest compartments for both short and long range planning.

2. In order to maintain a current and accurate database, changes in forested, developed, and open landscapes must be recorded as they occur. Changes are generated primarily by timber harvesting, clearing for facility construction, and changes in military land utilization. These revisions should be updated at least semi-annually.

### 5303. FOREST GROWTH

1. Forest growth is determined by measuring the changes in frequency and dimension of trees in a given area over time. Major variables influencing forest growth include site (soil, nutrients, moisture), density, and individual tree species characteristics. Forest growth measurements are useful for determining forest health, site productivity, and periodic changes in forest growing stock volume.

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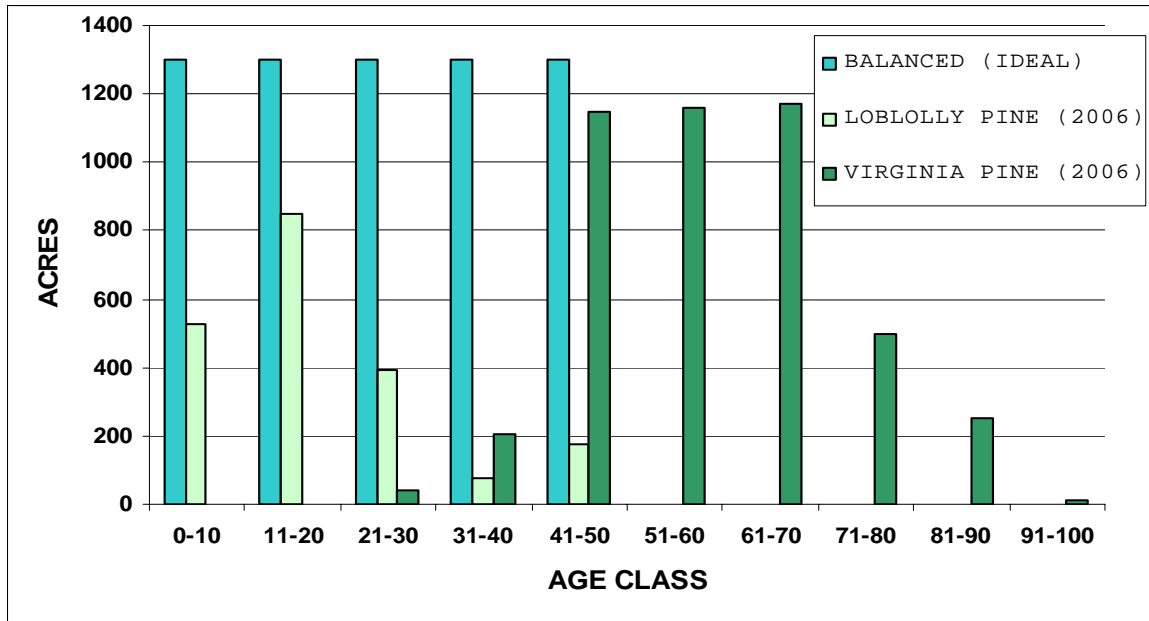


Figure 5-2. Acreages of Pine by 10-year age class for Compartments 1-35.

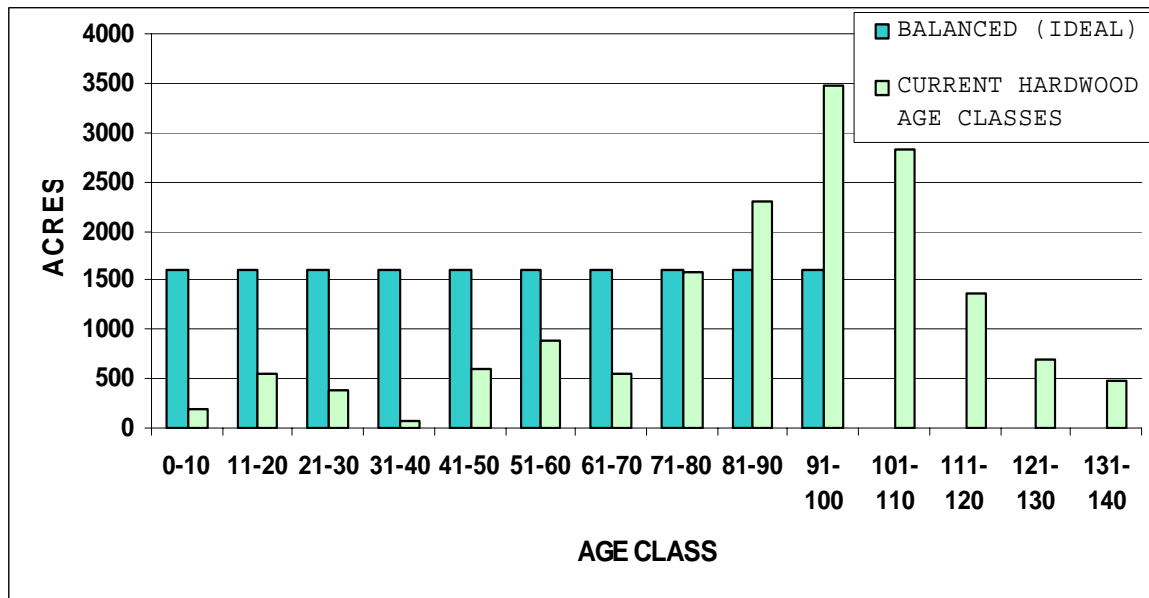


Figure 5-3. Acreages of Hardwood by 10-year age class for Compartments 1-35.

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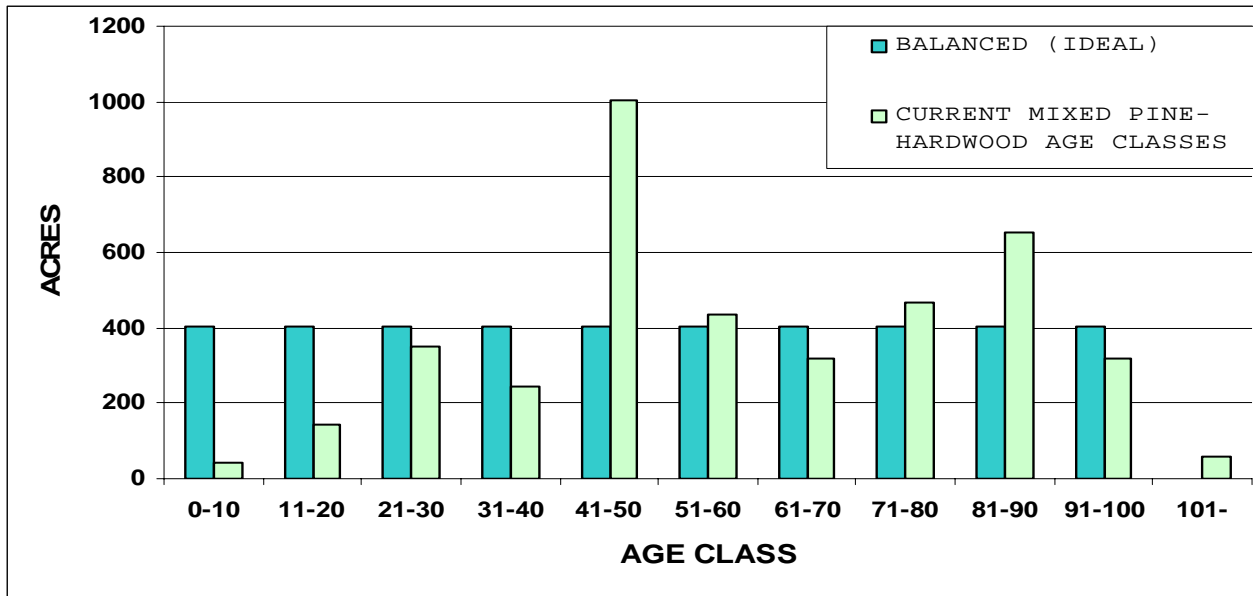


Figure 5-4. Acreages of mixed pine/hardwood by 10-year age class for Compartments 1-35.

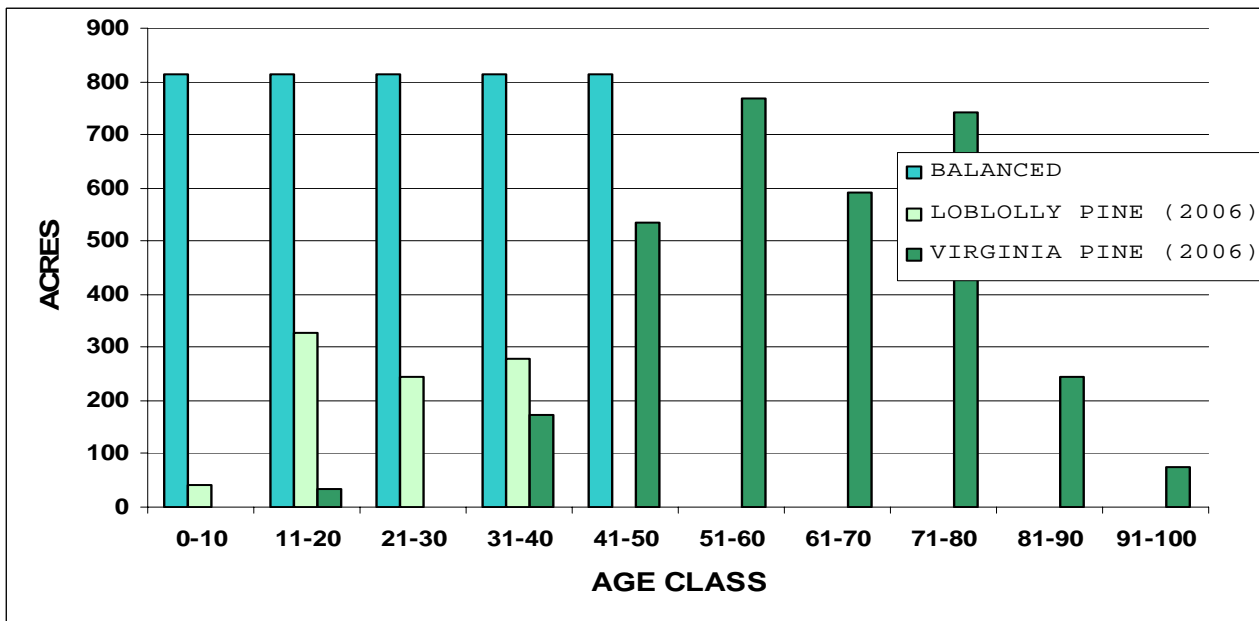


Figure 5-5. Pine acreages by 10-year age class for Compartments 36-65.

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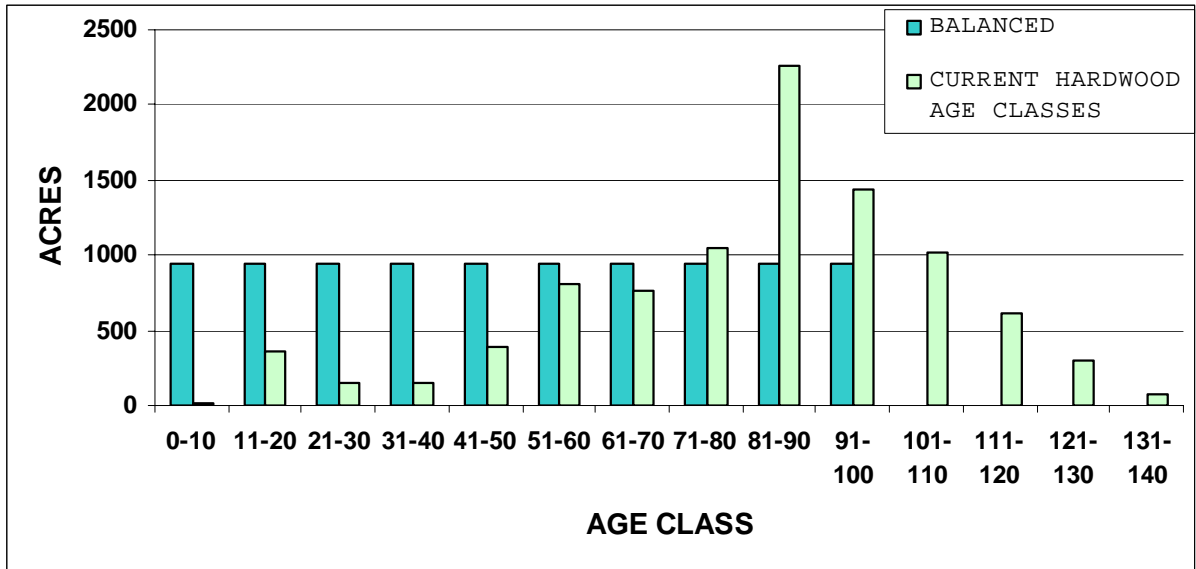


Figure 5-6. Acreages of hardwoods by 10-year age class for Compartments 36-65.

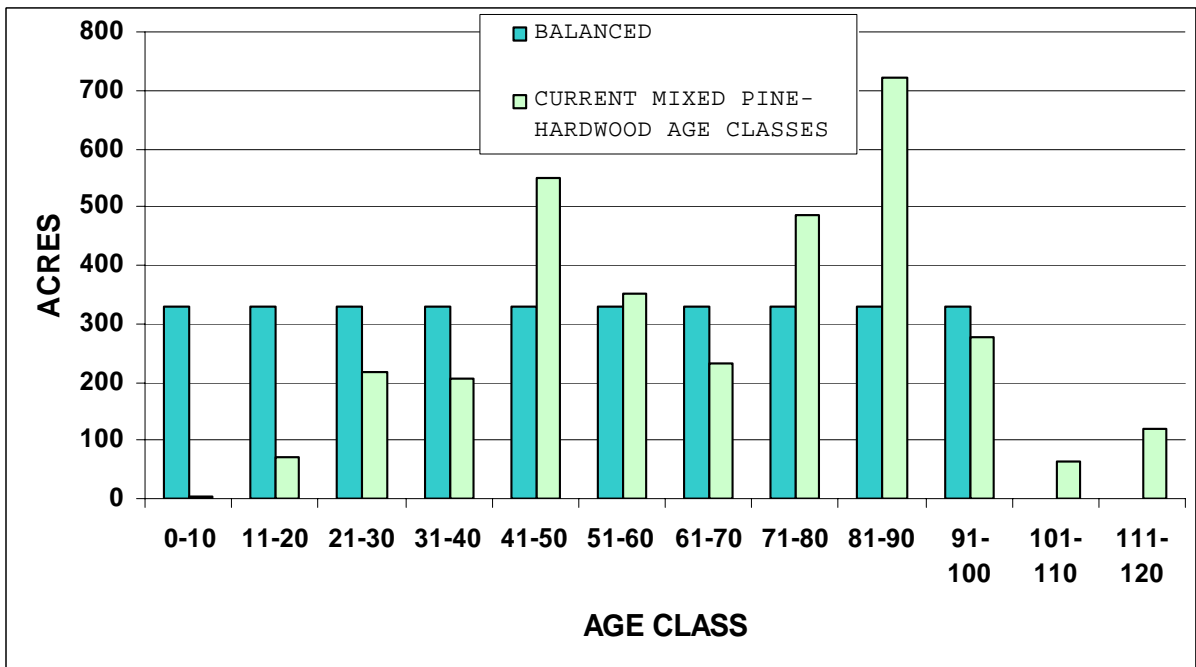


Figure 5-7. Acreages of mixed pine/hardwood by 10-year age class for Compartments 36-65.

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2. Forest growing stock volume is usually measured in terms of marketable product dimensions to obtain a direct monetary value of the total forest inventory. Through periodic measurements of this inventory, annual growth can be determined. Annual growth must be established if the volume regulation method of sustainable harvesting is utilized. Under this method, the net annual growth is available for harvesting on a sustained basis indefinitely (see paragraph 5306 below for a more detailed discussion of forest regulation methods).

3. Forest health and site productivity are normally evaluated at the individual stand level, and require measurements of mean and periodic annual incremental growth, and age and height on a small number of typical representative trees.

4. Forest health improvements and growth of commercial tree species are maximized primarily through maintaining optimal tree density relative to site capability. The forester makes determinations of site capability, and applies the appropriate treatments to obtain the desired density or "stocking level."

### 5304. HARVEST ROTATION AGES

1. Harvest rotation age refers to the age at which mature forest stands are harvested and regenerated with new seedlings. Rotation ages are established through consideration of factors relative to the biological and economical maturity of various tree species of conifer and hardwood types. Other important age dependent factors such as seed production, tree growth, and tree health are also considered.

2. The term "harvest rotation" (or "rotation") refers to all events associated with maintenance and management of a forest stand from initial establishment at the seedling stage, through the final timber harvest removal and regeneration of a new stand. The following harvest rotation ages have been established at MCB:

- Conifer forest types: Age 50 (40-60). Includes Virginia pine, loblolly pine, and shortleaf pine.
- Conifer forest types: Age 100 (90-110). Includes white pine and eastern hemlock.
- Hardwood forest types: Age 50 (40-60). Yellow poplar.



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- Hardwood forest types: Age 100 (90-110). Includes all hardwood forest types. In certain hardwood stands having sufficient basal area of high quality veneer trees with healthy crowns, the rotation age may be extended to 120 + years.
- Mixed Conifer/Hardwood forest types: Some of the stands in this forest type will be converted to conifer forest types (approx. 1/3) and hardwood forest types (approx. 1/3), and managed on the appropriate 50 or 100 year rotation age, accordingly. The remainder of these stands (approx. 1/3) will continue to be managed as mixed pine/hardwood forest types on a 70-year rotation age (see paragraph 5404 for more detailed information on management of mixed conifer/hardwood forest types).

5305. SUSTAINABLE ANNUAL HARVEST. The "sustainable annual harvest" is the maximum amount of wood products that may be harvested from a forest area on a yearly basis. This level is based on the productive capability of the forest area, and is established to ensure that an equal annual sustained yield of forest products can be harvested perpetually, without depletion of the resource. The methods utilized for determining and regulating the sustainable annual harvest will be discussed in paragraph 5306 below.

### 5306. REGULATION OF FOREST HARVESTING

1. The harvesting of forest products is governed by the management objectives established in paragraph 5102 above. Additionally, paragraphs 5304 and 5305 established harvest rotation ages and identified the requirement for determination of sustainable annual harvest levels. These management guidelines have been structured to ensure that quality training and multiple use benefits are derived from the forest resource. When maximum sustainable annual harvesting levels are achieved optimal age class diversity, tree growth, and production of forest products are realized. Forest health is also improved proportionately as tree growth and vigor are increased.
2. Equal annual levels of harvesting provides consistent returns from the sale of forest products, which funds forest management operations. Consistent funding is essential to ensure stability in the timely application of forest management treatments.
3. Determination of the sustainable annual harvest is accomplished by one of the following two methods.

## INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

### a. Volume Method

(1) This method requires the determination of average net annual growth per forest area. This is accomplished through the establishment of permanent inventory sample plots in proportion to the percentages of acreages of various forest types. These plots are measured at periodic intervals (usually 5 years) and all trees are tagged for future identification. Measurement techniques must be identical on successive surveys to ensure accuracy. The differences in measurements between successive inventories represents net growth, after adjustments for mortality and new ingrowth have been made. All data must be organized and summarized separately by forest types and adapted to an annual basis.

(2) The major problems with this method are that it is too labor intensive, and may not provide accurate information unless sampling is sufficient to ensure that all forest types are represented proportionately. All stands are not sampled, so the collected data is actually an average for sampled stands within a forest type. Individual stand data is therefore, not available.

### b. Area Method

(1) The area method of regulation has been utilized exclusively at MCB since 1988, and will continue to be the method of choice. Under this method equal amounts of forest area (acreages), rather than net average growth are harvested on an annual basis. The amount of annual acreage to be harvested is determined by dividing the total acres of forest type under management, by the appropriate rotation age (Paragraph 5304) of that forest type. This would be calculated as follows:

$$Y = \frac{A}{R} \quad \text{where;}$$

$Y$  = Annual Harvest  
 $A$  = Forest Type Acreage  
 $R$  = Rotation Age in Years

(2) Forest Management Zone 1 is the only fully manageable zone in which sustained yield timber management will be practiced. There are a total of 35 forest compartments and 26,526 forested acres in this management zone (see Table 5-3). Of this 26,526 acres, 6,500 are pine, 15,932 hardwood, and 4,094 mixed pine/hardwood. Tables 5-4, 5-5, and 5-6 show the sustainable annual harvest acreages for each of these major forest types. Criteria for management of the mixed pine/hardwood type are established in paragraph 5404, 1. For planning purposes, one-third of the acreage of mixed types (4,094/3) will be managed as hardwood types, one-third as pine types, and one-third as mixed pine/hardwood types.

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TABLE 5-4. SUSTAINABLE ANNUAL HARVEST FOR PINE  
FOREST TYPES (FOREST MANAGEMENT ZONE 1)

Forest Type	Pine	Mixed Pine/Hardwood BA >= 60% Pine
Acres	6,500	4,094/3
Rotation Age	50	50
Sus Annual Harvest Ac	130	27

TABLE 5-5. SUSTAINABLE ANNUAL HARVEST FOR HARDWOOD  
FOREST TYPES (FOREST MANAGEMENT ZONE 1)

Forest Type	Hardwood	Mixed Pine/Hardwood BA >= 60% Hardwood
Acres	15,932	4,094/3
Rotation Age	100	100
Sus Annual Harvest Ac	159	14

TABLE 5-6. SUSTAINABLE ANNUAL HARVEST FOR MIXED  
PINE/HARDWOOD FOREST TYPES  
(FOREST MANAGEMENT ZONE 1)

Forest Type	Mixed Pine/Hardwood BA 41-59% Pine/Hdwd
Acres	4,094/3
Rotation Age	70
Sus Annual Harvest Ac	19

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(3) Summarizing the information in Tables 5-4, 5-5, and 5-6 above, the total sustainable annual harvest acres for Forest Management Zone 1 is calculated to be:

- Pine Forest Types:  $(130 + 27) = 157$  acres
- Hardwood Forest Types:  $(159 + 14) = 173$  acres
- Mixed Pine/Hardwood Types:  $(19) = 19$  acres

(4) These values represent an average for compartments within Forest Management Zone 1. Actual annual harvest levels will vary somewhat due to the differences in proportions of forest types among compartments. Therefore, actual sustainable annual harvest levels must be calculated on an individual compartment basis using the same criteria established above.

(5) It is not desirable or practical to enter all forest compartments every year for harvesting. Consequently an entry period interval of 10 years is utilized. The selection of the length of entry period directly determines the age class structure for the various established rotation ages. For example, in pine stands with an established rotation of 50 years and an entry period interval of 10 years, there will be 50/10 or 5 age classes of equal acreage. This means that a compartment will be entered every 10 years for harvesting, and 20% of the pine forest type acreage would be harvested. For hardwood stands with a 100-year rotation there will be 100/10 or 10 age classes, and 10% of the hardwood forest type acreage would be harvested within a given compartment at each 10-year entry period.

(6) It is obvious that an age class is equivalent in acres to the sustainable annual harvest conducted at each 10-year entry period interval. Since each age class is constantly advancing to the next age class after each 10-year interval, there is always an age class of mature forest that has reached the end of the rotation age and must be regenerated. For this reason, harvesting is always conducted in the final mature age class, and the associated forest management treatment provides for the establishment of a new forest stand. The entire age class must be regenerated and is exactly equivalent to the sustainable annual harvest acreage. For this reason, the sustainable annual harvest is often referred to as the "allowable regeneration harvest."

(7) Forest stands are thinned to improve tree vigor, forest health, timber quality, wildlife habitat, and species diversity until they reach the end of the established rotation age. These thinnings

## INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

are called "intermediate harvests" because they do not affect the overall age class structure of the stand. As such, they are not considered a part of the sustainable annual harvest acreage.

### 5307. ANNUAL HARVEST SCHEDULE

1. The annual harvest schedule is formulated to identify the sequence of forest compartments to be harvested for the future ten-year period (2006-2016). This harvest schedule was developed by prioritizing compartments with large acreages of over mature timber (both pine and hardwood), utilizing past harvesting history, providing for dispersal of harvests among compartments, and balancing total acreages of scheduled compartments on an annual basis.
2. Table 5-7 shows the 10-year harvest schedule, and the map in Figure 5-8 identifies the location of scheduled forest compartments. The annual harvest schedule only includes compartments in Forest Management Zone 1, which has been identified as fully manageable. This zone contains 35 forest compartments, which means that approximately 3.5 compartments (2653 acres) should be entered each year of the established 10-year harvest schedule period.
3. The 10-year harvesting schedule will be closely followed. Natural and environmental factors such as ice, snow, wind, and fire damage may dictate changes in harvesting priorities, however. Changes in military land use requirements may also necessitate deviations from this schedule.

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TABLE 5-7. TEN-YEAR TIMBER HARVESTING SCHEDULE FOR FOREST MANAGEMENT ZONE 1 (COMPARTMENTS 1-35).

	<u>COMPARTMENTS</u>	<u>ACRES</u>		<u>COMPARTMENTS</u>	<u>ACRES</u>
2006	<div><div>28</div><div>29</div><div>13</div><div>1</div></div>	810	2011	<div><div>3</div><div>14</div><div>21</div></div>	1084
		494			709
		945			1085
		643			2878
	Tot 2892			Tot 2878	
YR (1)			YR (6)		
2007	<div><div>9</div><div>10</div><div>25</div></div>	1531	2012	<div><div>7</div><div>8</div><div>16</div></div>	658
		356			1783
		607			377
		2494			2818
	Tot 2494			Tot 2818	
YR (2)			YR (7)		
2008	<div><div>6</div><div>22</div><div>23</div></div>	1101	2013	<div><div>12</div><div>24</div><div>35</div></div>	899
		791			1237
		602			697
		2494			2833
	Tot 2494			Tot 2833	
YR (3)			YR (8)		
2009	<div><div>4</div><div>5</div><div>19</div><div>20</div><div>34</div></div>	437	2014	<div><div>11</div><div>31</div><div>32</div><div>2</div></div>	459
		555			481
		562			438
		522			1132
	Tot 2572			Tot 2510	
YR (4)			YR (9)		
2010	<div><div>17</div><div>18</div><div>30</div></div>	833	2015	<div><div>26</div><div>27</div><div>15</div><div>33</div></div>	757
		873			810
		667			765
		2373			331
	Tot 2373			Tot 2663	
YR (5)			YR (10)		

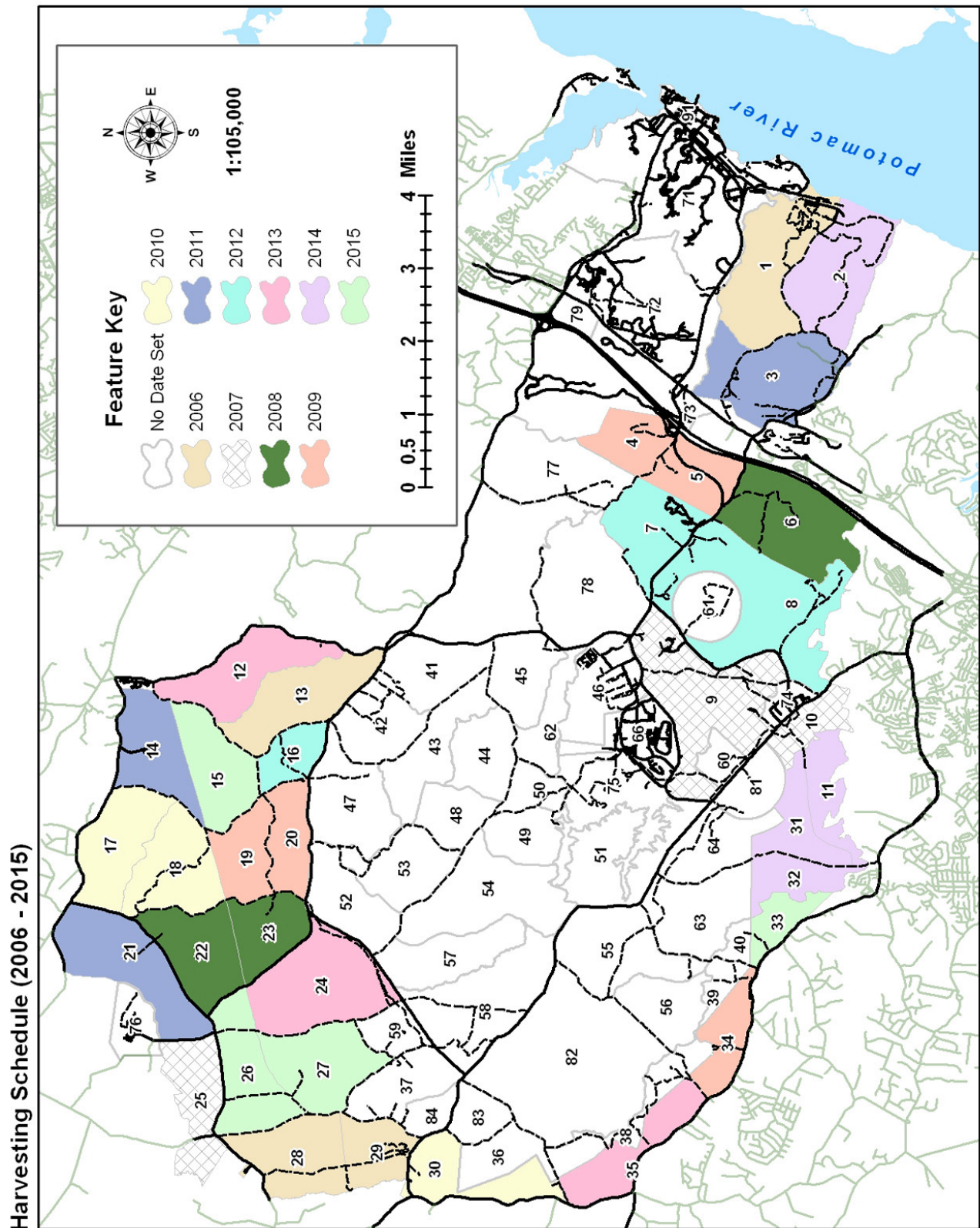


Figure 5-8. Harvesting Schedule (2006-2015)

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# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

## CHAPTER 5

### FOREST RESOURCES

#### SECTION 4: SILVICULTURE

5400. DEFINITION. Silviculture is defined as "the theory and practice of controlling forest establishment, composition, structure, and growth" (Spurr, 1979). The immediate foundation of silviculture is silvics, which is the study of the growth and development of individual tree species. In addition to silvics, the practice of silviculture demands knowledge of related disciplines such as ecology, plant physiology and pathology, entomology, hydrology, and soil science. Silvicultural practices will be designed to achieve the forest management objectives identified in paragraph 5102.

5401. SILVICULTURAL HISTORY AT MCB. Since the beginning of the professional forest management function at MCB in 1962, several types of silvicultural practices have been applied to forest stands. During this time, pine stands were the major emphasis of management, primarily because of the abundance of overmature stands in poor condition. A limited amount of hardwood stands were occasionally harvested, although there were not any perceived threats to hardwoods at the time, and staffing was minimal. Beginning in 1991, the MCB Forestry program began more intensive hardwood management, primarily because of the effects of the gypsy moth. Regardless of this influence, the direction toward more intensive hardwood management was inevitable as large acreages of hardwood stands were beyond rotation age, and exhibiting poor health conditions. Hardwood acreages dominate conifer acreages at MCB by a ratio of roughly two to one. Compared to conifers, hardwood management is considerably complex. This is because of the larger number of hardwood species that usually grow in association. Accordingly, silvicultural management decisions for multiple species become increasingly difficult due to varying and conflicting species requirements.

#### 5402. SILVICULTURAL GUIDELINES AT MCB

1. The application of silviculture involves the development of a "silvicultural prescription" for an individual forest stand, which is the basic management unit. All forest stands within a given forest compartment are analyzed for required silvicultural

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treatments. Forest compartments are selected for review and treatments every 10 years, based on their prioritized year of entry in the ten-year timber maintenance harvesting schedule (see paragraph 5307).

2. An analysis of forest stands within a scheduled compartment is accomplished by reviewing existing stand inventory data and field examination. Silvicultural prescriptions are then developed by the forester in concert with established allowable harvest levels and other management objectives and guidelines. These prescriptions will incorporate provisions for maintaining and improving forest health conditions; long-term sustainability of forest resources; current and projected land uses; diversity of plant and animal communities; the balance of age classes within forest compartments; and the spatial distribution of harvests. Silvicultural prescriptions will also incorporate measures to prevent negative impacts on soil and water resources, habitat for animal and plant communities, and visual aesthetic qualities of the forest. To achieve forest management objectives, silvicultural practices will attempt to:

- a. Maintain or improve forest characteristics for the primary purpose of military training, followed by compatible consumptive and non-consumptive uses of the forest resource for the public, over the long term.
- b. Control stand structure (shape, size, position, etc.).
- c. Control species composition (desired mixes of trees species in a forest stand).
- d. Optimize stocking (number of trees per acre).
- e. Prevent or minimize effects of damaging agents (insects, disease, fire, wind, ice, animal, etc.).
- f. Preserve site qualities (legally protected, unique, or otherwise valued resources such as historical, soil, water, plant, animal, visual, and recreational).

3. Silvicultural prescriptions must evaluate a number of factors. These include the required treatments of the forest stand, how these treatments will affect the ecosystem, the logistical requirements for implementing these treatments, the availability of personnel and resources, and the associated costs of implementation. The proposed actions must be complementary to the military mission and other known land uses. These combined factors may make the final silvicultural prescription complex, requiring input from a variety of base military and civilian personnel.

## INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

4. Since forest management functions are ultimately funded through the sale of forest products, all silvicultural prescriptions must be economically viable, meaning that costs associated with implementing silvicultural actions are not expected to exceed the income derived from the sale of forest products for any given fiscal year.

### 5403. SILVICULTURAL SYSTEMS

#### 1. Definition

a. The components of a silvicultural system consist of the methods chosen for regeneration harvest, site preparation, reforestation, various intermediate treatments, and the final regeneration harvest at the end of one growing cycle. Harvest methods are categorized as those that promote new forest stands (regeneration harvests), and those that are intended to maintain vigor and improve composition and structure of existing stands (thinnings). The primary component of a silvicultural system is the method of regeneration harvest. In fact, silvicultural systems are sometimes identified simply by the names of the regeneration harvest methods, but these do not technically define entire silvicultural systems.

b. Silvicultural systems are broadly divided into two categories; even-aged and uneven-aged. These categories refer to how the timber resource is regulated and maintained over time. Even-aged silvicultural systems include the regeneration harvest methods of clearcut, seed-tree, and shelterwood. Even-aged systems produce stands of trees which are roughly equal in age, whether or not they are equal in size. Uneven-aged silvicultural systems include the regeneration harvest methods of single-tree and group selection. Uneven-aged systems create stands of trees which vary in both age and size. Silvicultural systems begin with one or more of these five regeneration harvest methods, however, various applications of these methods are utilized. Specific applications vary the harvesting intensities, patterns, and selection of species targeted for removal, based on the existing stand conditions and management objectives. The selection of a harvest method, or silvicultural system is primarily influenced by tree species characteristics such as tolerance to shade, susceptibility to windthrow, adaptability to soil and moisture conditions, biological and economical age of maturity, seed production and dispersal, tolerance to fire, and vulnerability to insects and disease.

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5404. PRIMARY SILVICULTURAL SYSTEMS AT MCB. This Section briefly describes the most common silvicultural systems anticipated for use at MCB during the term of this plan. Slight deviations from these systems may occur, particularly in the timing of intermediate treatment applications. Intermediate treatments are applied as needed, which often does not correspond with the normal planned 10-year compartment entry period. Due to specialized equipment requirements, the forest products derived from intermediate treatments are normally marketed separately from those derived from regeneration harvests. Intermediate treatments are discussed in further detail in paragraph 5405. Some basic tenets have been established at MCB for silvicultural practices on stands under continuous forest management. These guidelines apply to all silvicultural systems, and are described below.

- Even-aged and uneven aged regeneration harvest units shall not exceed 40 acres. Average size will approximate 20-25 acres.
- Rotation ages for pine stands shall be 50 years, 100 years for hardwoods other than yellow poplar, and 50 years for yellow-poplar. Mixed pine/hardwood stands will be managed on the same rotational basis as above, with the assumption that these stands will ultimately be divided into approximately equal parts: one third pine, one third hardwood, and one third to remain as mixed pine/hardwood managed on a 70 year rotation age.
- Harvest units shall be irregular in shape to maximize edge habitat for wildlife and for aesthetics, however, narrow fingers and numerous sharp angles should be avoided, as these create difficult circumstances for prescribed burning and require considerably more fireline construction.
- Den and cavity trees shall be retained for wildlife in harvested stands. Several snags (dead or nearly dead trees) which are well away from the edge (in units that will require prescribed burning) of a harvest unit will also be retained.

1. Primary Conifer and Mixed Conifer/Hardwood Silvicultural Systems at MCB. The primary conifer type at MCB is Virginia pine. Loblolly and shortleaf pines are minor types. The mixed Virginia pine/oak type (SAF 78)(Eyre 1980) is transitional between Virginia pine and the eventual climax forest, composed of Virginia pine, oaks and other hardwoods. Because of the vast difference in rotation ages, (50 for

## INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

pine and 100 for hardwood) these mixed stands are extremely difficult to maintain and manage as mixed pine/hardwood stands. Mixed stands with 60% or more of the basal area in pine are relatively easy to convert to pure pine types. Likewise, mixed stands that contain 60% or greater hardwood basal area are relatively easy to convert to pure hardwood types. Conversion of mixed pine/hardwood stands to either pure hardwood or pure pine types will be based on these criteria. Mixed pine/hardwood stands which contain roughly 50% pine and 50% hardwood basal area (range of 41% to 59%), are difficult to convert to either pine or hardwood. For this reason, these stands will continue to be managed as mixed pine/hardwood stands on a 70 year rotation. This will perpetuate a component of the naturally occurring mixed pine/hardwood type, thereby maintaining biodiversity of forest ecosystems.

a. Virginia Pine (SAF 79) & Pine/Hardwood Mix (SAF 78). Clear-cut with conversion to loblolly (SAF 81) or shortleaf pine (SAF 75). The objective is to maintain the acreage of pine timber types, but to convert to a pine species which is fire tolerant (due to the frequency and wide distribution of fires on the Base), a better timber producing species, as well as a species which can be thinned to control the stocking. The same prescription will be followed for both Virginia pine (SAF 79) and mixed pine/hardwood (SAF 78), which have 60% or greater pine basal area.

- Clearcut harvest at age 50.
- Site prepare by broadcast burn and/or mechanical piling and burning.
- Plant loblolly or shortleaf pine on 9'x 9' or 8'x 10' spacing.
- Conduct survival and competition surveys, replant or release trees to the desired stocking and composition.
- Prescribe burn beginning at age 10 and at periodic intervals thereafter, not more than every five years.
- Thin at ages 20-45 (2-3 times) according to an appropriate stocking guide.
- Regenerate by clearcut or seed-tree harvest at age 50.

b. Virginia Pine (SAF 79) & Pine/Hardwood Mix (SAF 78). Clear-cut with natural regeneration to Virginia Pine (SAF 79). The objective is to maintain a natural component of the native Virginia pine type. Primary applications of this prescription include; to avoid planting large contiguous areas of loblolly and shortleaf pine; and to utilize this species in certain areas on the Base perimeter or around developed facilities where the planting of loblolly or shortleaf pine could actually elevate the risk of fire (due to

## INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

heavier fuel loading of pine needles). A component of the Virginia pine type should be maintained in most compartments, however, this prescription should be used judiciously in the appropriate areas and circumstances, after careful consideration of impacts to training. Natural regeneration of Virginia pine results in dense thickets that normally remain as such, for up to 20 or more years. These stands are not conducive to training in most cases. Planted loblolly and shortleaf pine, on the other hand, have a minor impact for a short period of time. The same prescription will be followed for both Virginia pine (SAF 79) and mixed pine/hardwood (SAF 78), which have 60% or greater pine basal area.

- Clearcut or seed-tree harvest at age 50.
- Allow natural regeneration. Require tree-length skidding in contracts to ensure that all slash is brought to landing. This eliminates the requirement for broadcast burning in the unit, which destroys pine seeds in the litter layer.
- Conduct regeneration surveys early (1st and 2nd year). If necessary, provide supplemental planting of genetically improved VA pine on 20' x 20' or wider spacing.
- Regenerate by clearcut or minimal seed-tree dispersion harvest at age 50.

c. Virginia Pine/Hardwood Mix (SAF 78). Pine removal harvest with natural conversion to hardwood. This prescription is applied to mixed stands with hardwood basal area greater than 60%, recognizing that natural succession is more advanced in this stand since the greater component is hardwood. The pine component of this mixed stand would not normally survive through the 100 year hardwood rotation, so it is harvested.

- Thin at age 50. Remove Virginia pine and all poor formed, suppressed, and otherwise undesirable hardwoods.
- Natural reproduction will occur in some openings where pine was removed. However, reproduction will favor species with tolerance to shade, and a two-aged stand will develop until final harvest.
- Shelterwood or other even-aged regeneration harvest at age 100.

d. Virginia Pine/Hardwood Mix (SAF 78). Clearcut harvest with maintenance as Virginia pine/hardwood mix (SAF 78). This prescription recognizes the difficulty in converting a stand that

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is less than 60% pine or 60% hardwood to a pure type of either component. Although mixed pine/hardwood stands are virtually impossible to manage on long rotations (100 years), due to the short life span of Virginia pine, a 70 year rotation age with regeneration by clearcutting will maintain a stand of similar species composition.

- Clearcut harvest at age 70.
- Allow natural regeneration. Require tree-length skidding in contracts to ensure that all slash is brought to landing. This eliminates the requirement for broadcast burning in the unit, which destroys hardwood and pine seeds in the litter layer.
- Thin to reduce basal area at age 40-50 if necessary and feasible.
- Clearcut harvest at age 70.

### 2. Primary Hardwood Silvicultural Systems at MCB

a. Shelterwood Harvest (Normal). May be applied to stands where the desired regeneration is shade tolerant or of intermediate shade tolerance. This method has application for regeneration of some intermediate shade tolerant oak species, such as black, white, chestnut, and northern red oaks. Other species that will also benefit include hickory, beech, blackgum, and red maple. The system may also be utilized for regenerating stands with slightly less shade tolerant species, as long as the harvest is such that the remaining trees do not create a heavy shade canopy, and are removed as soon as the site is fully occupied by regeneration.

- Apply seed cut of shelterwood system at age 100. Select appropriate basal area of residual trees to favor desired species regeneration requirements.
- Conduct regeneration/stocking survey 5-8 years after seed cut. If regeneration is adequate, apply removal harvest of residual "shelter" trees at 10 years after seed cut. If regeneration is inadequate, wait 5-8 years and reevaluate.
- Adjust stocking and release crop trees using a pre-commercial thinning by age 20, if necessary.
- Apply free thinnings at ages 50 and 80.
- Apply seed cut of shelterwood system at age 100.

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b. Shelterwood Harvest With Emphasis on Gypsy Moth Defoliation Risk Reduction. This prescription may be applied to stands which have a relatively pure component of species that are highly susceptible to gypsy moth (SAF types 16, 44, 52, 53, and 59). The objective is to reduce gypsy moth defoliation potential over the long term by increasing species diversity in these stands. Species that are less susceptible to defoliation and provide mast for wildlife will be increased in the entire stand through harvesting, regeneration, and thinning applications.

- Apply seed cut of shelterwood system at age 100. Promote species diversity by increasing the percentage of tree species less preferred by gypsy moths throughout the entire stand. These include such species as yellow poplar, hickory, walnut, ash, beech, blackgum, and pine. Also leave dispersed healthy oaks with dominant crown positions for seed production.
- Aerial spray or otherwise control gypsy moths (if required) to ensure survival of residual trees until regeneration is adequate.
- Conduct regeneration/stocking survey 5-8 years after seed cut. If regeneration is adequate, apply removal harvest of residual "shelter" trees at 10 years after seed cut. If regeneration is inadequate, wait 5-8 years and reevaluate.
- Adjust stocking and species composition through application of a pre-commercial thinning by age 20.
- Apply sanitation thinnings at ages 50 and 80 to further reduce gypsy moth susceptibility.
- Apply seed cut of shelterwood system at age 100.

One variation to this basic procedure is to leave the residual seed/shelter trees, even after the stand is adequately stocked. This retains some large trees on the site for wildlife and aesthetics. This application, however, should leave a minimal number of seed trees to avoid suppressing regeneration and also minimize economic losses from leaving the most valuable timber trees on the site. Another slight variation entails inter-planting some gypsy moth resistant species such as pine, ash, or yellow poplar to diversify the stand and reduce the overall susceptibility following the seed cut. On poor dry sites where regeneration is difficult, and a single non-resistant species such as chestnut oak may dominate the site, pine should be inter-planted to maintain a mixed stand throughout the rotation.



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c. Overstory Retention Harvest. Single Tree and Group Selection Methods. This prescription may be applied to hardwood stands where maintenance of a continuous cover of mature trees is necessary for military training, to meet certain wildlife management objectives, or where heavier types of harvests are visually unacceptable. The single tree selection method is generally ineffective for reproduction of oaks, or anything other than the most shade tolerant species. The group selection method can promote regeneration of oaks and less shade tolerant species if groups of trees .25 to .5 acres in size are harvested. The single tree and group selection methods are an attempt to convert even-aged stands into uneven-aged. These two methods are more complex and expensive to administer than other silvicultural systems. They require more entries, more road construction, and it is often necessary to skid timber through previously harvested and regenerated areas. Although technically difficult to administer, these applications can achieve the desired objectives. With these prescriptions, age class distribution is manipulated within the stand, as opposed to over the entire forest compartment with the other methods.

- Apply single tree (age 100) or group (patches or strips) selection harvest at age 80-100. In single tree system, harvest trees in distinct size (or age) classes according to an appropriate stocking index designed for maintaining uneven-aged structure. In group selection system, harvest circular patches or rectangular strips of trees, well distributed throughout the entire stand. Harvest approximately 20% of the total stand area.
- Allow to naturally regenerate.
- Adjust stocking within the regenerating areas by crop tree release, as necessary.
- Repeat the above steps every 20 years.

d. Streamside Management Zone (SMZ) Harvest Single Tree Selective Harvest. This procedure will be applied within SMZ stands or portions of stands (primarily SAF type 57). The SMZ is approximately 50-75 feet wide on each side of perennial or intermittent streams. The widths of these zones may vary, depending on slope, erosion potential, drainage, and the type of vegetation present. SMZs will be managed to maintain specific tree species that are best suited to moisture conditions on individual sites and fulfill wildlife and timber management objectives. Species such as yellow poplar, beech, green ash, and blackgum should be favored. Upland oaks and hickories should be maintained on drier portions of the SMZ.

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- Harvest 20 percent of the basal area in these areas using a single tree selection harvest. Remove trees which are off-site, diseased, poor formed or otherwise undesirable, and a few dominant trees. Retain den, cavity, and large diameter trees, as recommended to meet fish and wildlife management objectives in this zone.
- Allow to naturally regenerate.
- Repeat single tree selection harvest, but not more frequently than every 20 years.

5405. INTERMEDIATE TREATMENTS. Intermediate treatments are defined as those measures taken after stand establishment, which are intended to enhance the growth, vigor, and value of the selected crop trees. They may also be referred to as "cultural treatments" or "timber stand improvements". This section provides a brief description of the types of intermediate treatments anticipated for use at MCB.

1. Release. This is a treatment to free desirable young trees from the competition of undesirable trees through various means, including chainsaw, power brush cutter, brush axe, chemicals, heavy equipment, and prescribed burning. Chemical methods include aerial spraying, backpack spraying, hand application of pelletized chemicals, and tree injection. Hand labor methods include gas powered chainsaw or brush cutter, and brush axe. Mechanical release using heavy equipment is accomplished through use of bulldozers with drum-chopper attachments, heavy duty bush hogs, and large cutter head systems which mulch woody stems up to six inches in diameter. Prescribed burning can be cost-effective for restraining the growth of competing vegetation, while enhancing the quality of wildlife habitat. It cannot be used, however, until the desired species have developed bark thick enough to provide fire resistance. Several of these methods have been tried over the years at MCB with varying degrees of success and expense. Of the methods mentioned, the ones most likely to be used during the term of this plan are chainsaw/brush cutter, prescribed burning, and both aerial and hand application of chemicals. For the chemical application methods, a site specific environmental assessment will be written to address impacts of these actions on a case-by-case basis.

2. Thinnings. Thinnings are applied to immature stands to increase vigor of remaining trees, to control species composition, and to regulate density of stands. They are the most effective means of manipulating stand composition and stocking, while providing valued raw materials of pulpwood, firewood, and sawtimber. Thinnings can be applied "commercially" or "pre-commercially", referring to the

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merchantability of the trees being cut. Under commercial thinning, the cost of doing the work is less than the value of the trees, resulting in an income generating sale contract. Under pre-commercial thinning, the trees are typically left on the site and the work is paid for by the Government under a service contract. While the objectives of thinning can be achieved pre-commercially, it is wasteful, cost prohibitive, and can add large amounts of woody fuels that increase wildfire potential. For these reasons, thinnings will be accomplished on a commercial basis at MCB. The primary thinning methods are low, crown, selection, and geometric. Free thinning is a combination of several of these methods applied simultaneously. Sanitation and salvage thinnings are undertaken in stands which have been damaged by insects, disease, or fire, for the primary purposes of recovering some value from the trees and to reduce potential spread of insects and disease. Due to the complexity of the thinning methods listed above, they have only been mentioned, rather than providing detailed descriptions of each.

3. Pruning. Pruning for forest management purposes is labor intensive and expensive, and therefore difficult to justify. It is regarded as a special treatment to improve form and value of selected quality trees. Pruning has been applied primarily to black walnut and fruit trees around old homesites, through the use of NREA Conservation Volunteer labor. It is anticipated that this type of work will continue on a small scale through the use of volunteer labor. Pruning can be used to improve aesthetic quality and site visibility (for security purposes) in developed areas that are adjacent to woodlands. On a small scale, this might be accomplished through volunteer labor or Marine crews. On a large scale, this type of work would be performed through a service contract, as it is not a funded forest management function.

### 5406. SITE PREPARATION AND REFORESTATION

1. Site Preparation. Site preparation is the term for cleaning up previously harvested areas in order to establish a new forest stand. It involves reducing logging debris to improve aesthetics, diminish wildfire potential on the site, decrease impediments for foot travel through woodlands by military and recreational users, and to eliminate or impede existing seed sources and advanced reproduction on a site. The principal obstacles to establishing regeneration are residual slash from harvesting operations, and existing competing vegetation on the site. The types of site preparation commonly used in this area include various mechanical, chemical, and prescribed burning methods. These methods are described in detail in the

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"Silvicultural Handbook", located at the Forestry Office. The amount of preparation required will vary from site to site and is determined after the harvest operation is completed. The intended form of site preparation will be specified in the site specific stand prescriptions, which are developed prior to harvesting. Treatment selection will be based on effectiveness, economics, and environmental impacts. The following treatments have proven to best balance these considerations, and are proposed for use at MCB.

a. Prescribed Burning. Harvested areas are either broadcast burned or spot burned. This is done after a bulldozer exposes a narrow trail of bare soil encircling the unit. Broadcast burning is applied when there is a relatively continuous woody fuel layer to carry the fire. Spot burning is applied where small scattered piles of woody fuels exist which would not carry a broadcast burn. The typical application of broadcast burns occurs in clearcut pine stands, where conversion to another pine species requires a reduction of existing seed sources and competing vegetation. This type of burn may also be used in hardwood stands to reduce the amount of woody debris left after a logging operation. All prescribed burns are conducted under a burn plan, as described in paragraph 5602.

b. Mechanical Piling. This site preparation treatment includes piling of logging debris and undesirable standing trees by bulldozer. The bulldozer should ideally be fitted with a root rake blade for this type of operation, but a straight blade can be used, provided the operator is experienced enough to not displace topsoil. The resulting piles should be relatively free of soil. This type of work is labor intensive and costly, and is typically only used when broadcast burning cannot be conducted in a timely manner, and planting must be completed in the spring following harvest. The resulting piles are normally burned prior to planting.

c. Felling of Residuals. This treatment requires hand labor using a chainsaw, or a bulldozer to cut or push over the residual trees on a site following a clearcut harvest. These methods remove undesirable advanced reproduction and seed sources from the site to be regenerated. They are usually employed where there are sufficient residual stems to restrict growth of the desired reproduction. This method is less site disturbing than mechanical piling, and is appropriate for sites on which a minimum of site preparation is needed. However, prescribed burning may follow this method when a more thorough level of site preparation is desired.

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2. Reforestation. As forest stands approach maturity they lose vigor and become less healthy. By this time, they are nearing the end of the rotation age (see paragraph 5304). Provisions must be made for the regeneration or "reforestation" of these stands prior to harvesting at this time. Site and species requirements for regeneration are carefully evaluated. The regeneration requirements determine the type of harvest system to be applied. Reforestation will be accomplished by one of two methods, naturally (from seed), or artificially (by planting seedlings). These two methods are discussed in detail below.

### a. Natural Regeneration

(1) This is the process of obtaining a new forest stand from seed trees left on the site, seed in the litter layer, and/or from stump and root sprouts from trees removed in the harvest operation. Natural regeneration of deciduous trees is achieved by the seed tree, single-tree selection, shelterwood, or group selection regeneration harvest methods. The single tree selection, shelterwood (at 50-65 residual basal area), and group selection (less than .25 acres) methods encourage the regeneration of tree species that are shade tolerant to moderately shade tolerant. Most of the MCB conifer species are shade intolerant, and require the clearcut and seed tree systems for successful natural regeneration.

(2) The advantage of natural regeneration is that it is relatively inexpensive to implement initially. However, too much regeneration often occurs. The number of regenerated seedlings can be as high as 10,000-30,000 per acre. Reducing the seedling density and releasing preferred crop trees (see paragraph 5405) can be very laborious and costly. Early attempts to perform crop tree release are usually unsuccessful, because the cut vegetation sprouts back vigorously and quickly returns to the previous conditions. Normally it is best to wait until about age 15-25 to perform these treatments. By this time, natural competition will have reduced the number of stems per acre by 75% or more. Prescribed burning may be utilized in certain applications, however this method is selective toward fire tolerant species and may not provide sufficient species diversity or preferred crop tree retainment. Due to the ease of application and the relatively small expense, this method deserves further evaluation to determine its applicability for various species at MCB.

### b. Planting

(1) Seedlings are planted on sites where certain tree species cannot be regenerated naturally, where a conversion to another

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species is desired, or where additional supplemental regeneration is required to provide diversity or assure the establishment of adequate regeneration. Planting is performed by hand, and bare root seedlings are utilized. At MCB planting is normally utilized in Virginia pine stands that are clearcut, because Virginia pine cannot be selectively harvested and conversion to loblolly or shortleaf pine is preferred in most cases. Table 5-8 details the reforestation by planting for the 18-year period 1988-2006. During this period, approximately 1,019,484 seedlings were planted on 1913 acres.

TABLE 5-8. REFORESTATION AT MCB QUANTICO (1988-2005)

YEAR PLANTED	ACRES PLANTED	# TREES PLANTED
1988	130	76,000
1989	114	67,000
1990	245	132,300
1991	171	95,000
1992	233	127,000
1993	234	123,500
1994	122	52,000
1995	0	0
1996	102	43,400
1997	102	55,000
1998	0	0
1999	108	59,000
2000	102	50,500
2001	0	0
2002	95	54,000
2003	0	0
2004	0	0
2005	69	38,000
2006	86	46,784
TOTAL	1,913	1,019,484
AVG/YEAR	101	53,657

(2) Planting has a considerable advantage over natural regeneration in that stand density can be controlled by manipulating tree spacing. Control over species composition of the new forest stand is also more easily maintained. Most tree nurseries now offer pine seedlings of superior genetic quality. Growth and form of these trees over natural ones are improved by as much as 25-30%. These seedlings usually grow faster than competing vegetation and quickly establish dominance on the site.

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(3) Currently, the technology for producing hardwood seedlings of commercial timber species for planting is not as advanced as conifers. This is primarily because conifers are more hardy and better adapted to surviving on a wider variety of sites. While some success has been achieved with planting green ash seedlings at MCB, attempts to plant white and red oaks were unsuccessful. Due to the limited success and high cost associated with planting hardwoods, natural regeneration will be the primary means for regenerating hardwoods.

(4) Planting is usually accomplished by a service contract issued through the Contracting Officer (CO), Public Works Branch at MCB, through the authority of the Department of Navy, Engineering Field Activity Chesapeake, Washington, D.C.

### 5407. REFERENCES

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## CHAPTER 5

### FOREST RESOURCES

#### SECTION 5: SALE OF FOREST PRODUCTS

##### 5500. INTRODUCTION

1. Management of the forest resource is accomplished through the application of stand treatments defined by silvicultural prescriptions (paragraph 5402). However, these treatments can only be implemented if they generate sufficient revenues to be cost effective. Consequently, all forest management decisions must be assessed for profitability.

2. The application of silvicultural treatments is achieved primarily through timber harvesting, which is designed to realize maximum utilization of the forest products removed. At MCB these forest products include firewood, hardwood veneer logs, and pulpwood and sawtimber of both pine and hardwood tree species. Forest products are marketed through contract sales of timber that are advertised and awarded through sealed bids to the highest bidder.

##### 5501. LOCAL ECONOMY AND MARKETS

1. A number of factors influence the marketing of forest products at MCB. The single most important one is demand. Despite the fact that MCB is surrounded by heavily developed areas, the demand for timber products is relatively strong and stable. There are several mills located within the marketing area. These mills produce somewhat diverse products, but some overlap exists in the forest products utilized. This provides a slightly competitive market. The timber supply from surrounding areas south and west of the Base has been sufficient that MCB does not command top dollar. Prices received for stumpage are considered to be slightly above average. Since about 2003, rapid development in the entire area, (which has been listed as among the top 10-15 fastest growing in the country) has caused timber prices to decrease slightly, due to the large amount of cheaper available timber. Prices are not expected to increase much until development in the area slows. Long term, however, it is anticipated that prices will increase more rapidly, due to the depletion of the local timber supply as a result of development.

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2. MCB has been able to market its timber fairly consistently with the exception of problems encountered during 1993 and 1994, when there was an excessive amount of gypsy moth killed timber on the local market. Due to the abundant supply, this type of timber became difficult to sell except at low prices. Fortunately, all dead timber was soon liquidated through timber and firewood contracts.

3. Two factors which have sometimes adversely affected the Base's ability to market timber are, the presence of metal contamination in trees from military training exercises, and the cessation of contract harvesting operations due to military training activities.

a. The metal contamination in trees destroys milling equipment such as head saws, chipping saws, and firewood processors. This becomes very expensive, and mills are reluctant to bid on timber if they presume it to be contaminated. This factor has been largely mitigated through better identification of the areas of possible contamination, dispelling of the myth among local mills that all trees at MCB contain metal, and the allocation of replacement timber of like quantities and quality when metal contamination has been encountered.

b. Contract harvesting operations have occasionally been halted because of certain military training exercises. Contractors can not afford to have their equipment sitting idle, and will not buy timber contracts at MCB if they are forced to shut down operations, even infrequently. The "Limited Access Management Compartments Zone" (Compartments 36-65), (Figure -1) has been defined to exclude areas where commercial forest management operations are incompatible with training exercises, such as range firing or unexploded ordnance impact areas. Training exercises in the remaining areas of the Base should not preclude contract timber harvesting operations. Through the NEPA process, and advance planning and coordination with the Operations Division, conflicts can be averted so that both missions can be accomplished.

4. To achieve optimal marketing conditions and prices for MCB's forest products the following guidelines should be followed:

- Advertise timber sale contracts to all interested bidders to promote maximum competition. Allow adequate time for sale examination and contract review.
- Administer contracts equitably and consistently among all contractors.

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- Conduct periodic questionnaire surveys to update list of potential bidders, improve marketability of forest products, and define new product markets.
- Adjust timber sale contract size, payment unit amounts, and species and product types, to meet market demand and conditions.
- Extend advertisement into further market areas for high value products such as veneer and #1 grade sawlogs of oaks and yellow poplar.
- Maintain at least a two-year inventory of marketable timber sales with diverse species and products, to enable advertisements to coincide with optimal market demands and prices.

### 5502. TIMBER SALE PLANNING

1. Introduction. Forest management objectives and annual sustainable harvesting requirements were established in Sections 1 and 3 of this Chapter. The sequence of forest compartments to be harvested from 2006 to 2015 were also identified (paragraph 5307). Silvicultural examinations will be conducted on scheduled forest compartments to evaluate individual forest stand conditions, and prescribe the necessary treatments to improve forest health, and achieve other multiple use forest management objectives. These silvicultural prescriptions are normally implemented through timber harvesting, which is accomplished through contracted timber sales. Considerable effort is required to fulfill the many tasks associated with planning a contract timber sale. This effort must be duplicated several times to fulfill the annual sustainable harvesting goals.

2. Definition. "Timber sale planning" is the process of identifying and scheduling the sequence of events and work required to obtain the annual sustainable harvest established in Section 3 of this Chapter.

3. Requirements. Development of the 10-year forest compartment harvesting schedule (paragraph 5307) is the first major step in the timber sale planning process. Once this schedule has been established, annual and multiple year timber sale plans can be developed.

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### a. Annual Timber Sale Plan

(1) The annual timber sale plan is developed for those forest compartments scheduled for harvest in a given year. It should be noted that review begins at least 2 to 3 years ahead of the scheduled harvest year, to allow adequate time for the completion of all planning requirements. The annual timber sale plan should include the following:

- A list establishing the order of review for scheduled compartments.
- A quarterly schedule establishing dates for the completion of significant planning events (by compartment).
- A quarterly schedule showing the status of completion of significant planning events (by compartment).

(2) The annual timber sale plan is implemented by examination of each forest compartment, according to the established order of review. Timber sale proposals are then prepared for each compartment. Specific planning events necessary for the completion of a sale proposal are listed below.

- Assemble a timber sale planning file containing all available compartment information, maps, etc.
- Preliminary review of timber sale planning file data prior to field reconnaissance.
- Conduct forest stand examinations to determine treatment requirements, and develop silvicultural prescriptions.
- Conduct additional field visits to evaluate specific site characteristics relative to timber sale layout and design requirements.
- Calculate the sustainable annual harvest requirements for the compartment based on the area regulation method.
- Develop a timber sale harvest plan that achieves the sustainable annual harvest, includes adequate dispersion of harvest units, contains additional alternatives for varying harvest unit locations and treatments (where economically feasible), meets present and future forest management road access requirements, maintains environmental integrity, and satisfies all other established forest management objectives.
- Provide the proposed harvest plan to Head, Fish/Wildlife and Agronomy Section, NREA Branch to obtain input for wildlife management considerations.
- Provide the proposal to The Basic School (TBS) and Range Management Branch to obtain input for military training

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resource management considerations.

- Provide the proposal to NREA personnel for review.
- Arrange for a project scoping meeting with all other applicable personnel.
- Develop an Environmental Assessment (EA) (or categorical exclusion, (CE) if appropriate) for the project, based on environmental site analysis requirements and relevant issues identified in the scoping meeting. Include all possible feasible alternatives.
- Present the EA/CE at the quarterly Environmental Impact Review Board (EIRB) meeting to obtain project approval.
- Obtain signature/approval of project on a "Finding of No Significant Impact" (FONSI).
- Begin the timber sale preparation phase.

b. Multiple Year Timber Sale Plan. Multiple year timber sale plans are formulated the same as annual plans, but cover a period of 3-5 years. A minimum of 2-3 years advance planning is considered essential at MCB to allow for completion of all events necessary for a timber sale proposal. The items mentioned in "(2)" above require a minimum of 4-6 months for completion. In addition to these, other tasks associated with the timber sale preparation phase (see paragraph 5504) will require an additional 6 months to complete. Surveys for small whorled pagonia, a threatened plant species, can only be completed during a 2-3 month time frame in the summer. Therefore, it is important that these surveys be completed at least 2 years in advance. Historical and archaeological surveys may also be required for some areas. Maintaining a three-year advance timber sale planning schedule would provide a 1½ to 2 year reserve inventory of packaged timber sale proposals. This will help to ensure continuity in maintaining the annual sustainable harvesting requirements, and predictable levels of receipts from the sale of forest products. Equally important, it will provide increased revenues from the sale of forest products by affording some flexibility in timing advertisements of timber sales with market demands and prices.

### 5503. FOREST ACCESS ROADS

#### 1. Utilization

a. The roads and trails at MCB are used to provide routes of travel for military training, fire control, timber harvesting, other forest, wildlife, and natural resources management activities, and dispersed recreational activities. These roads are vital to the

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accomplishment of the military and natural resources management missions. The current network of roads at MCB has been classified into four categories. These include:

- Class I. Paved roads
- Class II. Improved Roads
- Class III. Semi-improved Roads
- Class IV. Unimproved Roads & Trails

b. Class I roads are self explanatory. Class II includes dirt roads that are well graveled and ditched, and Class III includes dirt roads containing portions of graveled and ungraveled surfaces, with or without ditching. Class IV roads and trails contain no gravel, and are usually not maintained, except through infrequent traffic or occasional clearing of vegetation by hand.

c. Forest management activities such as thinnings, timber harvesting, forest pest management, and fire control are dependent on an adequate road system. The requirements for fire control are discussed in Section 6, paragraph 5602. Timber harvesting requires a road system that will support tractor trailer trucks for transporting logs and logging equipment to and from the harvest site. Class I and II roads meet these requirements. Class III and IV roads do not.

### 2. Assessment of road requirements for timber harvesting

a. Road requirements are assessed in conjunction with timber sale planning within a forest compartment. The goal is to design an effective and economical transportation system that will satisfy present and future forest management and military requirements within a given forest compartment. Planning guidelines for achieving this goal are listed below.

- Determine the present and future road access requirements of the entire forest compartment to ensure that the minimal amount of road improvements, reconstruction, and new construction are compelled.
- Access harvest units directly with short, temporary entrances to loading decks where units are adjacent to roads.
- Utilize skid trails when possible to avoid constructing temporary roads.

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- Utilize existing roads and trails if possible.
- Any upgrades of existing roads or new construction should include design standards to ensure proper drainage, erosion control, water quality protection and minimal maintenance. Gates should be installed to control access if required.
- New construction requirements for planned road systems should be built incrementally at each 10-year entry period to distribute costs proportionately according to land area and timber values accessed.

b. These guidelines are designed to ensure that road improvements and new construction are kept to a minimum, but are appropriate to support long term use. Road access requirements will be planned and coordinated with TBS, Operations Division, and the Facilities & Logistics Services Section (FLSS), Facilities Division, to ensure that mission requirements of all concerned activities are met.

3. Implementation. Road improvements and new road construction for timber harvest access are accomplished primarily by the Forestry Section, with additional support from FLSS when required. In order to ensure that road work is completed on schedule, implementation should be started at least 1 to 2 years in advance of the planned sale contract advertisement date.

### 5504. TIMBER SALE PREPARATION

1. Definition. Timber sale preparation is the process of implementing all layout and design features of the timber sale plan, including: the transportation system requirements; delineating harvest unit boundaries; determining harvest unit land area; marking timber for removal; determination of timber volumes; estimating sale value; and preparation and advertisement of the timber sale contract.

2. Requirements. The Timber Sales Forester is responsible for completion of the tasks associated with timber sale preparation. While each task will not be discussed in detail in this plan, it is important to recognize the cumulative time requirements for their completion. Road access requirements usually demand the longest time periods for completion because of weather influences that restrict activities. For this reason, it is important that road work be initiated as soon as possible after a timber sale plan has been

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approved. The average large timber sale requires approximately 6 months for completion of all sale preparations (including advertisement). Extensive guidance on timber sale preparation can be found in the Forestry Office "Timber Sale Preparation Manual."

### 5505. TIMBER SALE CONTRACTS

1. Purpose. Upon completion of all timber sale field preparation tasks described above, a timber sale contract is prepared. This contract is specifically written to ensure that the timber sale planning objectives are accomplished, and environmental integrity maintained. The contract includes specific penalties for deviation from its terms and requirements, and failure to complete contractual obligations.

#### 2. Structure/Composition

a. The timber sale contract consists of three parts: General Terms and Conditions (standard clauses), Technical Specifications, and Sale Area Maps.

(1) Part I, entitled "General Terms and Conditions" contains 27 standard clauses that are common to all large sale timber contracts. Small sale timber contracts contain 19 standard clauses. These provisions are sometimes referred to as the "boiler plate", since they describe the general requirements of the sale and are standard for all timber contracts.

(2) Part II, entitled "Technical Specifications", contains the information, conditions, and requirements that are unique to a given sale. This part contains clauses which describe the work to be done, the estimated species and product volumes, the method and amount of payment units, the merchantability specifications of the forest products included in the sale, descriptions of specific operational procedures to be followed to ensure environmental protection, and penalties for specific areas of non-compliance.

(3) The sale area maps are usually attached to Part I, but are a separate essential component of the contract. Two maps are normally included. One identifies the general location area in relation to other surrounding features such as, roads and other recognizable landmarks. The other map is a more specific location map which identifies the individual payment unit and cutting unit locations, usually on a topographic map.



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3. Types of contracts. For convenience, timber contracts are divided into two categories. These include large and small sale contracts. This classification relates to the dollar value of the contract, and the type of equipment allowed to operate under the contract. Large sale timber contracts contain substantially more contract clauses and provisions, because of their more complex requirements.

a. Small sale timber contracts. Small sale timber contracts include those sales with an estimated value less than \$5,000. Most of these contracts are issued for firewood sales of 5 to 30 cords (occasionally 31-100 cords). The types of equipment permitted to operate on these areas are usually limited to pickup trucks, or low impact skidding machinery such as a small tractor. Small timber contracts provide only a small amount of the total contract revenues received.

b. Large sale timber contracts. Large sale timber contracts include those sales with an estimated value greater than \$5,000. These contracts permit the contractor to utilize skidders and other heavy equipment for timber harvesting. Large sale contracts provide the bulk of forest product revenues, and the means for achieving the sustainable annual harvest requirements.

4. Authority. Timber sale contracts are issued under the authority of a certified Contracting Officer through the Department of the Navy, Engineering Field Activity, Chesapeake, Washington, D.C. The Government representatives authorized to act administratively in relation to the aspects of timber sale contracts are as follows:

a. Contracting Officer: A Government employee who has the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer (CO) acting within the limits of their authority as delegated by the CO.

b. Contracting Officer's Representative (COR): A government employee who performs daily monitoring of Contractor performance, serves as the overall project technical representative, and has oversight for the Technical Specifications (Section II of the timber sale contract). The authority for COR is delegated from the Contracting Officer to one or more individual(s) in the Forestry Section.

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### 5506. EMERGENCY HARVESTING

1. NEPA. Occasionally, forest areas are damaged by natural causes such as insects and diseases, fire, ice, snow, and wind. These agents usually cause rapid deterioration of the affected forest products, and consequent decreased product value. It becomes necessary to salvage harvest this timber as soon as possible to prevent a total loss of value and the spread of insects and diseases to surrounding healthy forest stands. If the timber is not cleaned up and marketed while it is salable, then the Base must bear the responsibility and expense of cleaning up these areas to render them suitable for training.

Emergency harvesting projects must be evaluated through the NEPA process. Because of the short time requirements necessary to complete all tasks, it is essential that the NEPA process also be completed as quickly as possible.

2. Contracting. The contracting regulations allow some flexibility to expedite contracting procedures to accommodate emergency salvage harvesting requirements. Active large timber contracts may be modified to include additional timber at the contract product prices, or at negotiated prices that are agreeable to the Government and the Contractor. However, if there are no active large timber contracts, a new contract must be awarded. This requires considerably more time to complete a new contract document, contact potential bidders, provide site visits, and solicit formal bids for the timber. The normal time required for completion of these tasks on a routine timber contract is 5-7 weeks. This process is normally compressed into a 2-3 week time period to accommodate emergency harvesting requirements.

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## CHAPTER 5

### FOREST RESOURCES

#### SECTION 6: FOREST PROTECTION

##### 5600. FOREST HEALTH

###### 1. Introduction

a. The heavily forested environment at Marine Corps Base Quantico (MCB) is a unique and important component of the overall Marine Corps training mission. Monitoring and maintaining forest health is vital to assuring that this mission component remains viable. This requires a long term commitment of personnel and resources to properly identify and manage forest health related problems.

b. A healthy forest is neither static nor one without dead and dying trees. Forests are constantly changing as a result of natural forces such as insects, diseases, fire, and competition for nutrients and other life sustaining resources. Severe climatic forces such as frost, ice, drought, and wind can add additional stresses to the forest. Human activities such as training, recreation, and forest management can also have a direct or indirect affect on forest health conditions. The Forestry Section monitors these factors and their effects on forest health. Insect and disease problems are often initiated by poor growing and stagnant forest conditions, such as occur in naturally overstocked, and older forest stands. Therefore, one of the most important aspects of forest health maintenance is to improve growing conditions in the forest, which reduces the incidence and severity of forest health related problems. Growing conditions of the forests at MCB are improved through regularly scheduled timber harvests and timber stand improvement practices. Because of live firing fans that exclude timber harvesting and forest management on a large portion of the Base, management actions are sometimes directed only at cleaning up after forest health problems occur, rather than prevention.

###### 2. Guiding Principles

a. The basis and principles of "ecosystem management" were addressed in Chapter 3 of this plan. In implementing forest health management strategies, it is extremely important that the inter-actions of ecosystems be understood and evaluated for contributing

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effects. Strategies that preserve and complement natural ecological systems while promoting biological diversity are usually the best options for ensuring continued success in forest health maintenance.

b. The most effective means of maintaining long term forest health is to apply silvicultural practices which continually improve growing conditions for the remaining trees in a stand. A healthy, vigorously growing forest will tolerate environmental stresses significantly better than an unhealthy one, and will be less susceptible to attack from forest pests. Improvement of the overall health of forest ecosystems is accomplished through the use of forest silvicultural treatments implemented at the basic management unit level, the forest stand. These treatments are aimed at maintaining optimum stand stocking and density levels. Improvement thinnings, sanitation/salvage harvests, and the regeneration of mature forest stands promote vigorous and healthy forests. These treatments also improve species diversity and improve the spatial distribution of size and age classes. This also provides a very diverse forest structure, which will reduce the likelihood of forest pests and climatic factors causing widespread, catastrophic destruction as sometimes occurs in large, continuous, homogenous forests.

c. When serious forest pest problems occur, they will be evaluated with an Integrated Pest Management (IPM) approach. The IPM approach consists of the application of detection techniques of pest population levels, monitoring changes in these populations over time, and the consideration and employment of the appropriate control measures for a given site. This may include solutions such as natural or biological controls, mechanized or hand labor techniques, the use of silvicultural practices, chemical control agents, or any combination of these and other strategies. IPM typically utilizes a combination of approaches, and promotes sanitation practices and biological controls over chemical intervention. Management actions should be based primarily on population analysis and management objectives for a particular site. Other factors such as land use, access, environmental constraints, size of the area, and the value of the resources also influence decisions. If implemented properly, the IPM approach will produce effective population control results that are environmentally friendly.

### 5601. INSECT, DISEASE, AND OTHER FOREST PESTS

1. Forest Pest Management. A number of forest pests could become problematic for the training and environmental protection missions of

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MCB Quantico. The following is an attempt to identify and categorize the most serious potential threats to MCB woodlands, based on past history and current knowledge of local forest health conditions. The Forestry Section monitors forest pest problems and provides technical oversight for IPM solutions.

2. Local Forest Health Threats. Forest health problems are categorized below by their potential for causing large scale environmental or economic problems and for their potential to cause problems for forest-based training exercises. The insects, diseases, and miscellaneous forces are categorized below into three general categories, in descending order of significance. This ranking is based on past incidence and current knowledge of the pest's influence in this region. Pests may be categorized differently in other regions, where environmental conditions and the availability of suitable host trees differ. Insects and diseases may also combine with other insects, diseases, and environmental or weather related stresses to form a complex, which normally causes more serious problems than any of the individual components.

a. Primary Health Threats. These pests and miscellaneous influences are considered to be the most serious threats to MCB woodlands. They also represent the most likely threats to personnel safety. They have the potential to cause severe problems related to property damage and natural resources protection, and may require costly preventative and/or clean-up measures.

- (1) Hardwood Insects
  - (a) Gypsy moth (*Lymantria dispar* Linnaeus)
- (2) Conifer Insects
  - (a) Ips engraver beetles (*Ips avulus*, *Ips grandicollis*, *Ips calligraphus*)
  - (b) Southern pine beetle (*Dendroctonus frontalis*)
- (3) Hardwood Diseases
  - (a) Oak decline (a disease/insect complex)
- (4) Conifer Diseases
  - (a) Stem decay fungi - red heart (*Phellinus pini*),
  - (b) Brown cubical rot (*Phaeolus schweinitzii*)
- (5) Miscellaneous
  - (a) Climatic extremes (snow, ice, and wind)
  - (b) Wildfires

b. Secondary Health Threats. These factors are considered to be moderate threats for causing safety, economic, or aesthetic problems. They may cause localized, small to moderate sized outbreaks, or short term problems. However, they are not likely to cause a significant

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impact to the military training or environmental protection mission. Some secondary invaders are also included, which may be part of a more serious disease complex. Some have caused significant problems in places where land management practices, abundance of suitable host trees, or specific environmental factors favor their development.

- (1) Hardwood Insects
  - (a) Eastern tent caterpillar (*Malacosoma americanum*)
  - (b) Elm spanworm (*Ennomos subsignarius* Hubner)
  - (c) Fall cankerworm (*Alsophila pometaria* Harris)
  - (d) Forest tent caterpillar (*Malacosoma disstria*)
  - (e) Hickory bark beetle (*Scolytus quadrispinosus* Say)
  - (f) Red oak borer (*Enaphalodes rufulus* Haldeman)
  - (g) Two-lined chestnut borer (*Agrilus bilineatus* Weber)
  - (h) White oak borer (*Goes tigrinus* Degeer)
- (2) Conifer Insects
  - (a) Black turpentine beetle (*Dendroctonus terebrans* Olivier)
  - (b) Loblolly pine sawfly (*Neodiprion taedae linearis* Ross)
  - (c) Nantucket pine tip moth (*Rhyacionia frustrana*)
  - (d) Pales weevil (*Hylobius pales* Herbst)
  - (e) Virginia pine sawfly (*Neodiprion pratti pratti*)
- (3) Hardwood Diseases
  - (a) Oak wilt (*Ceratocystis fagacearum*)
  - (b) Shoestring (*Armillaria*) root rot (*Armillaria mellea*)
- (4) Conifer Diseases
  - (a) Annosum root rot (*Heterobasidion annosum*)
  - (b) Beech bark disease (fungus/insect complex caused by fungi of *Nectria* spp. and beech scale insects *Cryptococcus fagisuga* and *Xylococcus betulae*)
  - (c) Butt rots (*Polyporus*, *Hericius*, and *Pleurotus* spp.)
  - (d) Eastern gall rust (*Cronartium quercuum* f.sp. *quercuum*)
  - (e) Fusiform rust (*Cronartium quercuum* f.sp. *fusiforme*)
- (5) Miscellaneous
  - (a) Air pollution (particularly ozone)
  - (b) Animals (beaver, deer)
  - (c) Mechanical (logging and construction site damage, military vehicles, bullets, hunting stands)
  - (d) Nematodes

c. Minor Health Threats (Nuisances). These normally cause only minor economic or aesthetic impacts. They may become nuisances or cause localized problems on shade and ornamental landscape plants. They are not expected to cause major disruptions to land uses or

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natural resources at MCB, either due to their normal mode of action or the relatively low numbers of suitable woodland host trees available at MCB Quantico.

- (1) Hardwood Insects
  - (a) Carpenter worm (*Prionoxystus robiniae* Peck)
  - (b) Japanese beetle (*Poppillia japonica* Newman)
  - (c) Locust borer (*Megacyllene robiniae* Forster)
  - (d) Locust leaf miner (*Odontota dorsalis*)
  - (e) Orange striped oakworm (*Anisota senatoria*)
  - (f) Variable oakleaf caterpillar (*Heterocampa manteo*)
- (2) Conifer Insects
  - (a) Hemlock wooly adelgid (*Adelges tsugae*)
  - (b) Common bagworm (*Thyridopteryx ephemeraeformis*)
  - (c) Ambrosia beetles (*Platypus* spp.)
  - (d) Southern pine sawyer (*Monochamus titillator* Fabricius)
- (3) Hardwood Diseases
  - (a) Anthracnose (misc. fungi species of sycamore, dogwood, oak, walnut, and maple)
  - (b) Black knot (*Dibrotryon morbosum*)
  - (c) Butternut canker (*Sirococcus clavigignenti-juglandacearum*)
  - (d) Chestnut blight (*Endothia parasitica*)
  - (e) Corticium root rot (*Corticium galactinum*)
  - (f) Damping off (Misc. fungi)
  - (g) Dutch elm disease (*Ceratocystis ulmi*)
  - (h) Hispidus canker (*Polyporus hispidus*)
  - (i) Hypoxylon canker (*Hypoxylon* spp.)
  - (j) Powdery mildew (*Microsphaera alni* and *Philactini guttata*)
  - (k) Nectria canker (*Nectria galligena* and *N. Magnoliae*)
- (4) Conifer Diseases
  - (a) Littleleaf disease (*Phytophthora cinnamomi* complex)
  - (b) Pine tip blight (*Diplodia pinea*)
- (5) Miscellaneous
  - (a) Animals (voles, mice, sapsuckers)
  - (b) Hail
  - (c) Lightning
  - (d) Salt (for melting ice on roads and walkways)
  - (e) Spider mites (*Oligonychus* and *Eotetranychus* spp.)

3. Management Actions for Primary Health Threats. Only a few pests or miscellaneous influences are currently considered to be serious threats to the forest resources at MCB. They are discussed in more

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depth below. These threats will be given the most consideration when forest management actions are proposed. Detailed plans will be developed as these threats become imminent.

## a. Gypsy Moth (*Lymantria dispar* Linnaeus)

(1) Between 1990 and 1995, this insect caused significant destruction to MCB Quantico's forests. Because of the magnitude of the problems and the level of organization in place for this hardwood defoliator, it was addressed in a separate Gypsy Moth Management Plan. Although a written formal plan was not finalized until 1996, major management priorities and strategies for an IPM approach were developed and utilized when aerial spraying began in 1990. Additions have recently been added to the Gypsy Moth Management Plan to reflect current threat potential and new management strategies for this pest.

(2) Surveys for male moths, larvae, and/or egg masses have been conducted annually at MCB since 1981, to track the population trends of the gypsy moth. The male moth counts began to increase steadily between 1986 and 1990. Egg mass surveys conducted in the fall of 1989 indicated that moderate to heavy defoliation would occur over portions of the Base in 1990 unless suppression efforts were initiated. Aerial spraying began in the spring of 1990 and continued each year through 1995. Table 5-9 (below) shows the amount of acres aerielly treated for gypsy moths between 1990 and 1995. The total acres treated reflect substantial areas of retreatment, rather than 40,000 different acres of treatment.

TABLE 5-9. GYPSY MOTH ACRES TREATED BY AERIAL APPLICATION							
	1990	1991	1992	1993	1994	1995	
<u>TREATMENT USED</u>							<u>TOTAL ACRES TREATED</u>
Bt	1,772	3,460	1,480	921	2,089	1,394	11,116
Dimilin	4,486	9,241	4,082	3,430	2,890	4,000	28,129
Gypchek		450					450
<b>Tot Acres (By Year)</b>	6,258	13,151	5,562	4,351	4,979	5,394	39,695



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(3) MCB received funding for suppression activities from the United States Department of Agriculture, Forest Service (USFS). This funding is appropriated by Congress for forest pest suppression on Federal lands. Requests for funding are made through Headquarters Marine Corps, LFL and the DoD Armed Forces Pest Management Board, by completing USFS Form FS-3400-2, "Forest Pest Management Proposal." Funding received by MCB for the six year period of 1990 through 1995 totaled \$696,000.

(4) Due to aerial suppression efforts throughout the State, a naturally occurring virus which attacks gypsy moth larvae, and an introduced fungus, the gypsy moth population crashed in late 1995. Annual surveys showed that the population remained at extremely low levels in 1996 and 1997. From 1998-2001, trapping surveys indicated a gradual, continual increase in average male moth populations for the Base. A few individual survey areas experienced more rapid male moth increases, particularly in 2000 and 2001. Egg masses, however, were basically non-existent between 1995 and 2000. In 2001, egg mass surveys identified two areas with defoliation potential. These two areas containing 125 acres, were successfully treated by aerial spraying in May 2002. From 2003 through 2006, no treatments have been required. Gypsy moth populations are expected to follow the same general trend as the past 11 years. Isolated outbreaks in small areas may require periodic treatment, but large-scale sustained outbreaks are not anticipated.

(5) Eradication of the gypsy moth is not possible. One of the primary initial management objectives for this pest was to minimize the destruction by the initial onslaught, as large populations of the pest moved southward into the area. USDA, Forest Service funding for aerial spraying was limited to protection of those areas that were mission essential. This included reservoirs and associated watersheds, recreation areas, housing areas, roadside buffer areas, and those training areas that were vital to protect. Within these limitations, protection of all susceptible forest areas at MCB was not possible. As a result, hardwoods (primarily oaks) in untreated areas were defoliated and died.

(6) Immediate short term effects were the loss of a portion of the mature oak component that is valued for wildlife and timber, the hazards of dead trees for Marines in the training areas, and increased hazards from wildfires due to additional fuel loading and dead standing trees, which ignite. Most accessible dead timber was harvested, which helped to reduce safety hazards for Marines. Remaining dead trees have increased foraging areas for woodpeckers and sites for cavity nesting birds. The long term effects are

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expected to be less severe. Most of the areas are regenerating heavily with oak seedlings. Only a small number of pure white oak and chestnut oak stands experienced complete mortality. These areas will require at least 40 or more years before the new trees begin to produce acorns that are important for wildlife, and at least 60-70 years to produce timber adequate for harvesting.

(7) Overall, the management strategies employed for the gypsy moth at MCB were highly successful, as mission essential forest components were protected and overall damage was minimized during widespread epidemic population levels. Current management objectives for the gypsy moth are to continue to monitor population levels closely and conduct timely suppression activities if required. Forest management harvesting treatments will include prescriptions which reduce defoliation potential in susceptible stands. This requires increasing species diversity within these stands. While this may have the affect of reducing the oak component in purer stands, oak regeneration will be favored in all other stands where it is a minor component. The overall goal is reducing susceptibility, while increasing species diversity and broadening the range of oak distribution.

b. Southern Pine Beetle (*Dendroctonus frontalis* Zimmerman). Considered one of the most destructive pests of pines in the southern U.S., this insect attacks and often kills most species of pine, but prefers loblolly, shortleaf, Virginia, pond, and pitch pines. It bores under the bark and girdles trees of various sizes. During outbreaks, it colonizes and even kills vigorous and healthy trees. Natural control factors such as diseases, parasites, predators, and weather, help maintain beetle populations at low levels and bring cyclic outbreaks under control. IPM control techniques may be initiated for populations which become problematic. These include rapid salvage and utilization of infested wood, piling and burning all non-salable infested wood, cutting and leaving infested trees on the site (where additional potential hosts trees are not proximal), and chemical control (on high value landscape trees). Potential host trees within the uninfested buffer strip along the leading edge of the infestation are also removed or thinned to reduce probability of infestation to healthy surrounding trees. The best defense is to keep pine stands growing vigorously. The forest management program continues to maintain an aggressive course to thin loblolly pine stands and regenerate decadent Virginia pine stands.

c. Ips Engraver Beetles (*Ips avulsus*, *Ips grandicolis*, *Ips calligraphus*). Ips engraver beetles kill more pine trees in the

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Southern United States than any other forest insect except the southern pine beetle. Ips beetles usually attack injured, dying, or recently felled trees and fresh logging debris. Infestations are particularly common in trees weakened by drought or lightning strikes. Control calls for prompt removal and utilization of actively infested trees, making sure that the bark and slabs are destroyed. Insect parasites and predators, woodpeckers, and weather provide natural controls. Chemical control is seldom warranted under forest conditions, but may be used to protect pines in developed areas. Preventive practices include minimizing physical damage to trees caused by military vehicles, fire, metal contamination from bullets and ordnance, logging and construction equipment, and the elimination of pine logging slash through prescribed burning.

d. Oak Decline. The term "oak decline" is not reserved for any single disorder or syndrome. It is actually a slow acting complex of diseases. It results from the interactions of physiologically mature oaks under stress from pathogens and insects of opportunity. It is most often associated with other stresses as well, such as mechanical injury to roots, nutrient deficiencies, or changes in soil salinity. Often, the root systems of susceptible trees are colonized by the shoestring root rot (*Armillaria mellea*) or *Ganoderma* fungi, ordinarily non-aggressive decomposers. When colonized trees come under stress, the fungus becomes aggressive and destroys part of the root system. The most prominent and persistent symptom is crown dieback from the top downward and from the outside inward. Dieback is progressive, occurring over several years. Trees in the red oak group are more prone to oak decline mortality than those in the white oak group. The two-lined chestnut borer (*Agrilus bilineatus*) attacks trees severely weakened by decline, and is often the agent directly associated with tree death. Control must target prevention of the primary causal agent(s). This requires keeping trees healthy through silvicultural treatments, including stand sanitation thinnings, and judicious use of insecticides. Fertilization and irrigation are tools which can be employed for landscape trees, but are generally considered too costly and impractical to apply to the forest environment.

e. Stem Decay Fungi. Both hardwoods and conifers are affected by many species of stem decay fungi. The mode of action is basically the same. A succession of microorganisms colonize stem wounds or dying branches and prepare the tissue for invasion by fungal spores. Trees actively resist decay by compartmentalizing the affected area through the production of defensive chemicals, and with physical barriers inherent in wood anatomy. The ability to compartmentalize decay is based on vigor and tree genetics. Repeated wounding

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compromises the tree's ability to compartmentalize decay. Decay does not directly kill the trees, but mortality may result when affected trees are windthrown or break off at a weak point. The red heart fungus (*Phellinus pini*) is a common and serious example of a stem decay fungus. It is a problem with over-mature Virginia pine stands at MCB, and often causes tangled masses of trees from breakage and windthrow. Prevention of this condition at MCB is directed toward harvesting and regenerating mature pine stands before the fungus advances to the point that the stands become unmerchantable or impede training.

f. Climatic Extremes. The effects on trees from climatic extremes such as drought, wind, and ice are infrequent, but are sometimes severe. These forces stress trees, causing them to utilize stored carbohydrate and nutrient reserves. This stress often leads to colonization by secondary organisms, which ultimately may cause declines in growth, wood quality, or tree mortality. In pine stands, these secondary invaders include southern pine and ips engraver beetles, which can become problematic if not treated promptly. While extremes of weather are unavoidable, the effects on the forest resource can be managed to a degree. Rapid cleanup of dead and damaged trees is vital to keep the effects isolated. Timber sales for sanitation and salvage must proceed quickly, before the value of the wood deteriorates and secondary invaders begin to grow and spread to surrounding healthy trees. If the trees are allowed to deteriorate to the point that they are unmarketable, the standing dead trees become a safety hazard and liability to the Base.

g. Wildfire. Wildfires, or brush fires, are probably the most serious stresses to forest health at MCB. Nearly all wildfires are the result of pyrotechnic devices used in military training exercises. Although natural and human-caused fire may have been a part of the early history of this region, it has been largely excluded from the landscape in modern times. When fire is used under controlled conditions in appropriate places, and with prescribed objectives, it is a valuable tool for the control and manipulation of vegetation. Wildfires usually have detrimental affects, however. Many wildfires leave undesirable scarring on trees, introducing vulnerability to secondary invaders of rot, stain, and insects that enter fire wounds. Hot fires are particularly damaging to young trees and trees with thin bark, and frequently kill advanced seedling/sapling regeneration. Sprouting is usually vigorous following most wildfires. Although the forest is not permanently destroyed, it may become severely altered to a state which is unsuitable for training, and may require a number of years to recover. Therefore, prevention of wildfires and quick response to

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suppress fires is essential to avoid large scale forest health and aesthetic problems. Detailed information on wildfire suppression and the application of prescribed fire are provided in the following paragraph.

### 5602. FIRE MANAGEMENT

1. Introduction. The management and use of fire is an important aspect of the overall forest health management program. This paragraph discusses the control of wildfire and the use of prescribed fire. Both are important elements of the forest protection function in support of the military training mission. Mission readiness and natural resources stewardship at MCB Quantico must include a wildland fire suppression program to ensure protection of life, facilities, and forest resources. Wildfires are more frequent at MCB than surrounding areas because of the frequent use of incendiary devices used in military training. MCB contains some highly developed areas and is also being heavily encroached upon by private development along many of its boundaries. Controlling forest fires is increasingly important, since human life and property are at risk, as well as the natural biological communities. The application of prescribed fire will continue to be used as a preventative measure against large scale forest fires, as well as for a variety of land management objectives. The management of both wildland fire and prescribed fire requires trained, knowledgeable, and experienced personnel.

#### 2. Wildfires

a. Authority. Primary guidance and responsibilities of brush fire fighting are outlined in MCBO P11320.1, Fire Protection/Prevention Program, Chapter 1 and Appendix A.

#### b. Responsibilities

(1) Incident Command. The Incident Command System (ICS) will be utilized in wildfire suppression efforts. This system, established by the National Wildfire Coordinating Group, is outlined for implementation at MCB in MCBO P11320.1. According to this Order, fires related to training are reported to the Range Control Section, Range Management Branch, Operations Division. All other fires are reported to the Base Fire Department through emergency 911. Range Control has responsibility for notification of the Base Fire Department and Forestry Section whenever fires are reported. If the fires are not suppressed promptly by the training units on the scene,

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the Fire Department and/or Forestry Section will respond to the incident. Upon arrival on the incident, the Fire Department and Forestry Section will assume the role of incident commander(s) in a "unified command structure." The problem director and training unit will remain on the scene and render necessary assistance. The Incident commanders IC(s) shall serve as coordinator(s) of all firefighting resources at their disposal, including personnel, heavy equipment, and helicopters in directing suppression activities.

(2) The Forestry Section IC shall also serve as the on-scene advisor for natural resource protection. Where unique, sensitive, or specially protected natural resources are of concern, he shall help assure judicious and limited use of heavy equipment.

(3) Other organizations having strategic roles in fire prevention and suppression include:

- **Fire Protection/Prevention Branch:** Unified incident command with Forestry, initial attack firefighting personnel and equipment, primary manpower and organizational control.
- **Range Management Branch, Operations Division:** Dissemination of fire danger classification (FDC) level and enforcement of specific requirements; notification of fires in training areas to appropriate Base personnel; provide military firefighting personnel and equipment; provide training area access; ensure personnel safety around live ordnance zones; coordination of requests for helicopter support.
- **HMX-1:** Helicopter support for fire reconnaissance and aerial water drops (Figure 5-9).
- **Facilities & Logistics Services Section (FLSS):** Heavy equipment support for fire suppression and construction and maintenance of permanent firebreaks.
- **The Basic School (TBS) and Officer's Candidate School (OCS), Marine Corps University:** Reserve firefighting personnel support.



Figure 5-9. Valuable fire suppression support is provided by the HMX-1 Helicopter Squadron using a "Bambi Bucket" for water delivery.

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### (4) Fire Danger Classification

(a) In accordance with MCBO P11320.1, the Forestry Section is responsible for establishing fire danger classification (FDC) for the Base. This classification serves as the primary gauge for determining if certain military training operations utilizing incendiary devices should be rescheduled, due to high or hazardous fire conditions. The classification also alerts The Basic School (TBS) and the Officer's Candidate School (OCS) of the impending risks of fire development and the requirement to maintain a designated squad to reduce response time in the event of a fire. The Forestry Section utilizes a system that was developed by the Virginia Department of Forestry (VDF) to assess weather conditions to determine fire danger. The system incorporates numerical values for temperature, relative humidity, wind speed, foliage green-up condition, and days and amount of rain since last rainfall. These values are totaled to produce a summary rating, which is directly correlated to a FDC level. The Forestry Section has adapted the summary ratings to fit the existing Base FDC Levels defined in MCBO P11320.1.

(b) FDC (1) and (2) represent "normal" conditions in which fire activity is low and control is relatively easy. FDC (3) represents the "caution" level in which fires can become serious if not extinguished when small. Munitions that initiate fires are restricted in FDC (4) (High) and FDC (5) (Hazardous). Exceptions to these restrictions may be granted in FDC 4, provided that the pyrotechnic devices are utilized in a fire resistant area in accordance with MCBO P11320.1. Exceptions to the restrictions are not permissible in Fire Danger Classification 5 (Hazardous).

(5) Assessment of Damages. The Head, Forestry Section has responsibility for estimating any significant loss of timber or other natural resources caused by wildfires. This estimate is provided to the Head, Fire Protection/Prevention Branch, who reports this information in the DoD Fire Incident report, as required by MCBO P11320.1.

c. Safety and Training. Public and firefighter safety shall be the first priority in wildfire management. No resource or property values are worth endangering lives. All wildfire suppression actions and prescribed fire plans will reflect this commitment. Forestry Section employees who are trained in wildfire suppression will participate in the wildland fire program, as the situation and their level of training warrants. Training is available through the U.S.



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Forest Service, Virginia Division of Forestry, and other Federal Agencies. Forestry Section personnel shall receive firefighting training commensurate with duties outlined in their position descriptions. Forestry Section personnel shall wear proper protective equipment and clothing, and observe the standard firefighting orders during all wildfire suppression activities.

### d. Firebreaks

(1) Purpose and Need. Wildfires at MCB are caused primarily by military training exercises in and around live firing ranges and other areas where incendiary devices such as pop-up illumination and trip flares, smoke grenades, and tracer rounds are used. When firebreaks are properly installed and maintained, fires can be managed and kept to a minimal size. This reduces the amount of downtime for military training and the likelihood of fires escaping MCB lands.

### (2) Firebreak Plan

(a) The network of existing roads and improved trails at MCB provides access and containment boundaries for most fires. Large streams and water bodies also serve as natural firebreaks. However, these features do not make a reliable firebreak system to contain fires within a small manageable area. A firebreak system which forms a complete containment zone around areas with the highest fire incidence, such as live ordnance ranges and certain portions of training areas, is essential to properly manage fires and maintain these areas. This is the fastest and most effective way to control fires with minimum manpower, equipment, and danger, while also minimizing the affects on training activities.

(b) The Forestry Section, Range Management Branch, and Fire Protection/Prevention Branch identified deficiencies in the MCB firebreak system, and the Forestry Section took the lead in developing a plan to correct these deficiencies. The plan was completed in January 1999. It details location, design, and material specifications. The Firebreak Plan utilizes existing trails and roads wherever possible to minimize costs and limit environmental disturbances. However, some new construction was required. Firebreaks are designed as semi-improved roads (with spot graveling), for access by firefighting brush trucks. Features such as crowning, parallel ditching, and the installation of culverts and water diversion turnouts are incorporated to promote proper surface drainage and ensure long term utilization.

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(c) A categorical exclusion (CE) was prepared for the Firebreak Plan, and presented before the Environmental Impact Review Board (EIRB) on May 12, 1999. This project was approved by the Board for implementation. A copy of the Firebreak Plan is available for review in the Forestry Office. The map in Figure 5-10 details the location of all firebreaks. Work on construction and improvements of the firebreaks began in 1999. Almost all initial construction of new firebreaks has been completed, but only about half of all firebreaks have been upgraded with gravel applications.

(d) Upon completion, it is essential that firebreaks be routinely maintained for proper drainage, and to prevent vegetation from overtaking them. Grass and tree growth within the firebreaks causes them to become ineffective. Vegetation must be controlled by the use of herbicides or by mechanical methods. The most commonly used mechanical method involves grading the firebreak surface to remove the vegetation. This can cause erosion and sediment run-off problems. It also disturbs the compacted surface base, which makes the surface soft and subject to rutting, and necessitates the application of additional gravel. A soft disturbed surface also promotes the germination of additional grass seeds. Therefore, the mechanical method can be quite time consuming, costly, and last only for a short time. The preferred method is chemical treatment with a granular or sprayed herbicide, which provides both pre-emergent and post-emergent control for up to one year. This entails only treating firebreak surface areas that have existing grass. Treated areas should not require retreatment for at least 2-3 years. Construction and routine maintenance of the Base firebreaks remains the responsibility of the Facilities & Logistics Services Section (FLSS). The Forestry Section will continue to evaluate and recommend maintenance requirements to ensure that firebreaks remain functional.

(e) Changes in training activities may necessitate additions or adjustments to firebreaks. These changes will be evaluated and implemented as needed to ensure that the firebreak system remains functional to promptly control fires.

### 3. Prescribed Fire

a. Purpose. Prescribed burning is a vital tool in the MCB Forest Management program, particularly in the areas of forest stand establishment and maintenance. It is used for site preparation prior to reforestation, for reduction of fuels in the understory of established stands, and for reduction of competing vegetation in timber stand improvement. Prescribed fire is utilized on grasslands

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and woodlands within and immediately surrounding weapon firing ranges, to eliminate or reduce the risk of fires from incendiary devices used in training exercises. Controlled burning is also an important wildlife management tool for creating and maintaining grassland and woodland habitats for certain wildlife species.

b. Open Air Burning and Smoke Management. To address air pollution and smoke concerns, MCB Order 6240.2, the Air Pollution Episode, Standby Emission Reduction Plan and Open Air Burning Policy, designates which activities require special authorization and those which are excepted. The policy directs procedures for air pollution alert stages. The Forestry Section coordinates with the Virginia Department of Forestry to determine whether bans have been placed on burning due to stagnant or unsuitable atmospheric conditions. MCB Order 6240.2 also states that prescribed burning for range and forest management are permitted when weather and wind conditions are favorable to preclude the obstruction of visibility to vehicles and aircraft. In accordance with this Order, any open air burning requires approval of either the Head, Forestry Section or the Head, Fire Protection/Prevention Branch unless prior blanket approval of such burning has been granted. Specific authorization must be obtained from the Commander, MCB for any exceptions to the open air burning policy other than those listed in the Order.

### c. Requirements

#### (1) Annual Prescribed Burning Plan

(a) The Head, Forestry Section has responsibility for coordination and implementation of the Base prescribed burning program. An annual prescribed burning plan is prepared by the Forestry Section each year by February 1. This plan describes all proposed prescribed burning requirements at MCB for the current calendar year. Unit locations, types and methods of burning, equipment, manpower and safety requirements, and acceptable weather and fuel parameters are described in detail. The plan further defines additional compliance requirements for effectively and safely conducting prescribed burning. All annual burning requirements are submitted to the Head, Forestry Section, who will evaluate proposals to ensure that they can be safely conducted. The annual burning plan is then developed in conjunction with Range Management Branch to incorporate military training requirements, and is reviewed by the Head, Fire Protection/Prevention Branch.

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(b) Figure 5-11 shows the live-fire ranges that have high fire incidence due to the types of munitions fired. Annual burning of these ranges in late winter and spring is required to prevent delays or cancellation of military training. Ranges are burned under favorable weather conditions when training is not taking place. Burning creates a fire resistant area, which eliminates the requirement to stop training for fire suppression activities. Without prior burning, wildfires start under unfavorable weather conditions and can be difficult to control, with the likelihood of escape to surrounding training areas being high. Consequently, military training must be halted until fires are controlled. The creation of a fire resistant area provides additional options for granting a waiver to fire pyrotechnics in Fire Danger Classification level (4), according to the criteria established by MCBO P11320.1.

(c) Annual burning is also essential on ranges to maintain target visibility and prevent woody vegetation from becoming established. Due to extensive use, the ranges with the highest priority for burning include Training Area 9A (complex of ranges), Training Area 10A (R 15 ABC), Range 11, and the MOUT Range. Frequent training, and suitable weather requirements are factors that greatly limit available days for burning. With these limitations, and the large number of acres to burn, every opportunity must be utilized to complete all planned range burning requirements. Fire Department and Range Management Branch personnel assist in range burning operations. Burning is conducted on ranges in late winter and spring, when grasses are dry and dormant. Rarely, a few days of burning may be available in mid to late fall, but only after several frosts have turned the grass brown. Normally, temperatures and relative humidity levels do not allow sufficient drying of fuels to conduct prescribed burns on ranges in the winter months.

(d) The Range 5 firebreaks were completed in 2006. This range will be scheduled for prescribed burning in the near future to reduce hazardous conditions that have been increasing for a number of years. C-Demo and Murphy Demo are not shown on Figure 5-11, because these areas are currently being maintained by mowing, which eliminates the need for prescribed burning. These demolition ranges should be mowed once in the late winter prior to 1 February, to insure that the grass is low to prevent intense, fast moving fires. Once these ranges turn green, around 1 May, there is little danger of fires starting until after frosts in November, unless drought conditions occur. During drought conditions, the grass should also be kept low on these two ranges to reduce fire intensity. The fuel supply area (MCB 2) should also maintain the grass at low levels during periods when the grass is not actively growing.

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(e) Additional firebreak construction requirements that have been added include Range 12, Weapons Training Battalion (WTBn), and the WTBn Pop-up Range (P 305). Completion of the Goettge Demo firebreak remains a priority.

(f) Currently, training requirements do not necessitate burning OP 13 annually. Consequently, this range is being burned every two years to provide additional habitat varieties for wildlife. However, this area will require burning if it ignites from wildfires or during prescribed burns in Training Area 9A. The southeastern one-fourth of the area designated as Range 11, contains grasslands and mixed shrub/tree vegetation, which provides the opportunity to create additional habitat for bobwhite quail. This area is located north of the tracked vehicle trail. Interior patchy unburned islands can be created in this section by annually disking around desired areas. However, disking must be completed in the winter prior to the burning season and not interfere or delay prescribed burning on this range. Unburned islands should not be any closer to the firebreak than 125 feet, to allow for an adequate burned out perimeter.

(g) Wildlife management burns are primarily conducted at the same time of the year as live-fire range management burns. Figure 5-11 shows additional areas that are continually maintained for wildlife habitat by prescribed burning. These areas are normally burned at 1-3 year intervals and may have various alternating burned and unburned units or patterns, to meet specific brood or foraging habitat requirements for various species. Where compatible with military training requirements and overall Base fire management objectives, wildlife burning units are located between and adjacent to ranges, to provide a continuous grassland corridor. Additional information on prescribed burning for wildlife habitat management is provided in Chapter 6.

(h) Forest management burns are not shown in Figure 5-11, because their location varies from year to year over the Base area. They are included in the annual prescribed burning plan, however. Forest management and wildlife management units which require frequent or repeated burning, will not be located in close proximity to the Base perimeter. Special precautions will be taken when conducting site preparation burns for forest management in these areas. Burning shall be conducted under weather parameters of the prescription which would be considered very cautious rather than minimal. For example, calm or low wind, highest acceptable humidity, and not experiencing drought conditions.

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(2) Daily Prescribed Burning Plan. A written daily burn plan must be completed before initiating a prescribed burn. The Virginia Department of Forestry Form 69 will be utilized. This plan documents the location, size, fuel types, acceptable and predicted weather parameters, purpose and objectives, smoke management considerations, burning plan strategy (including personnel and equipment requirements), safety and notification procedures, a topographic map of the unit and surrounding area, and an escaped fire management plan. The Head, Forestry Section or his designated representative, will have final approval of all daily prescribed burning plans. Burning will not be conducted if weather conditions are out of prescription, personnel and equipment resources are inadequate, or smoke management considerations have not been properly evaluated.

### (3) Implementation

(a) The person implementing a prescribed burn, will be referred to as the "burn manager". The Head, Forestry Section will designate burn managers based on their qualifications and experience. Burn managers will also have successfully completed the Virginia Department of Forestry (VDF) "Certified Prescribed Burn Manager Program." Compliance with Code of Virginia, Chapter 11, Title 10.1, article 6.1, sections 10.1-1150.1 through 10.1-1150.6, provides that "any prescribed burning conducted in compliance with the requirements of this article, state air pollution control laws, and any rules adopted by the Virginia Department of Forestry shall be in the public interest and shall not constitute a nuisance"..and "shall not be liable for any damage or injury caused by or resulting from smoke." In addition to certification, VDF Form 69 is used on all prescribed burns at MCB, to ensure compliance with all aspects of article 6.1.

(b) The Forestry Section has developed a prescribed burning check-list which is utilized prior to the day of the burn. This check-list emphasizes essential tasks that must be completed in preparation for the burn. After VDF Form 69 has been completed, and prior to initiating the burn, the VDF go/no-go check-list will be completed. A "no" response to any item on this list will delay implementation until compliance with the item has been met. All appropriate County and Base authorities will be notified prior to conducting prescribed burning.

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5603. REFERENCES

U.S.D.A., Forest Service Technical Report R8-GR 5, "Insects and Diseases of Trees in the South", June 1985.

U.S.D.A., Forest Service Agricultural Handbook No. 558, "A Field Guide for Ground Checking Southern Pine Beetle Spots", 1980.

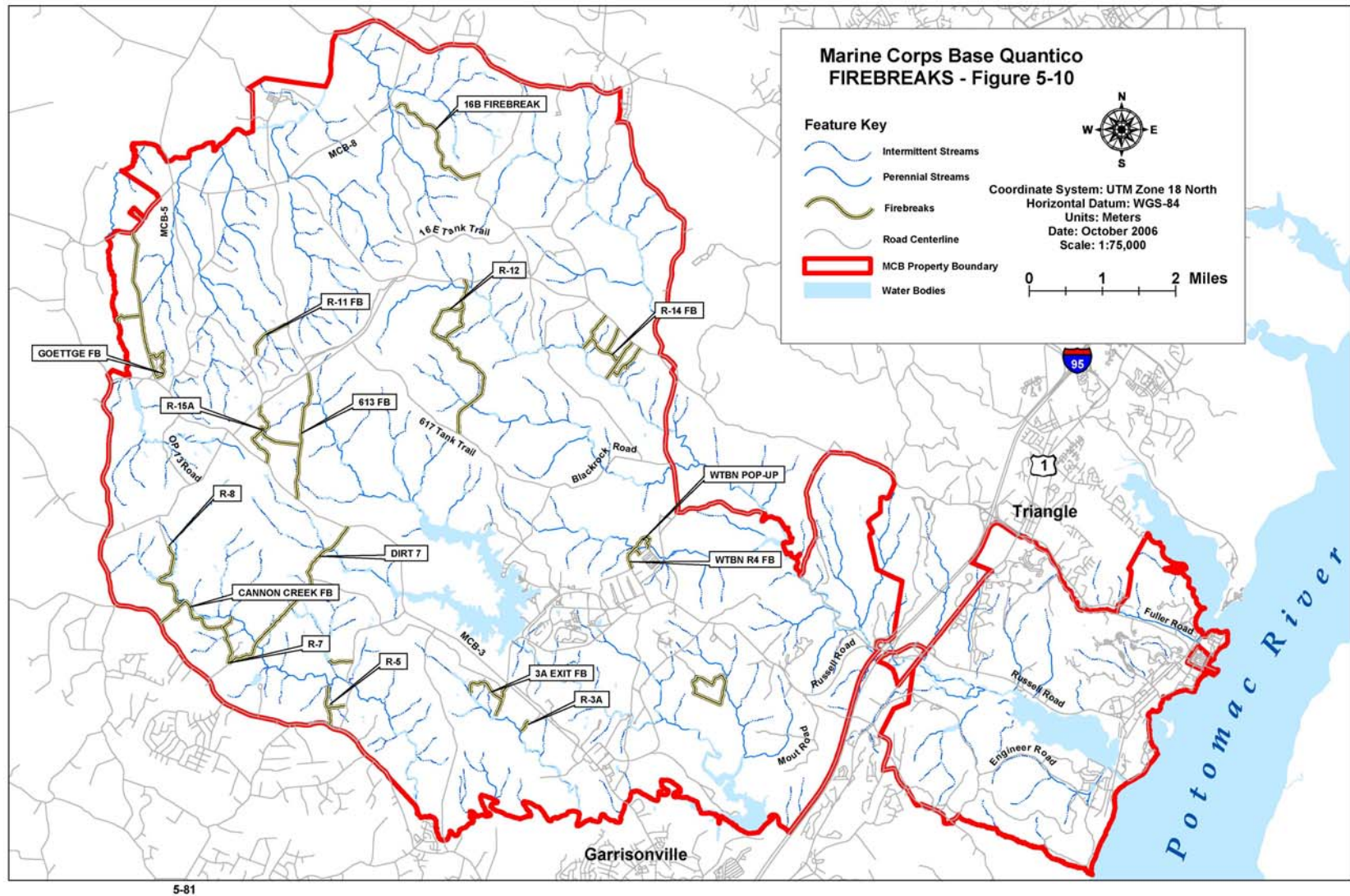
U.S.D.A. Forest Service General Technical Report NE-171,  
"Silvicultural Guidelines for Forest Stands Threatened by the  
Gypsy Moth", January 1993.

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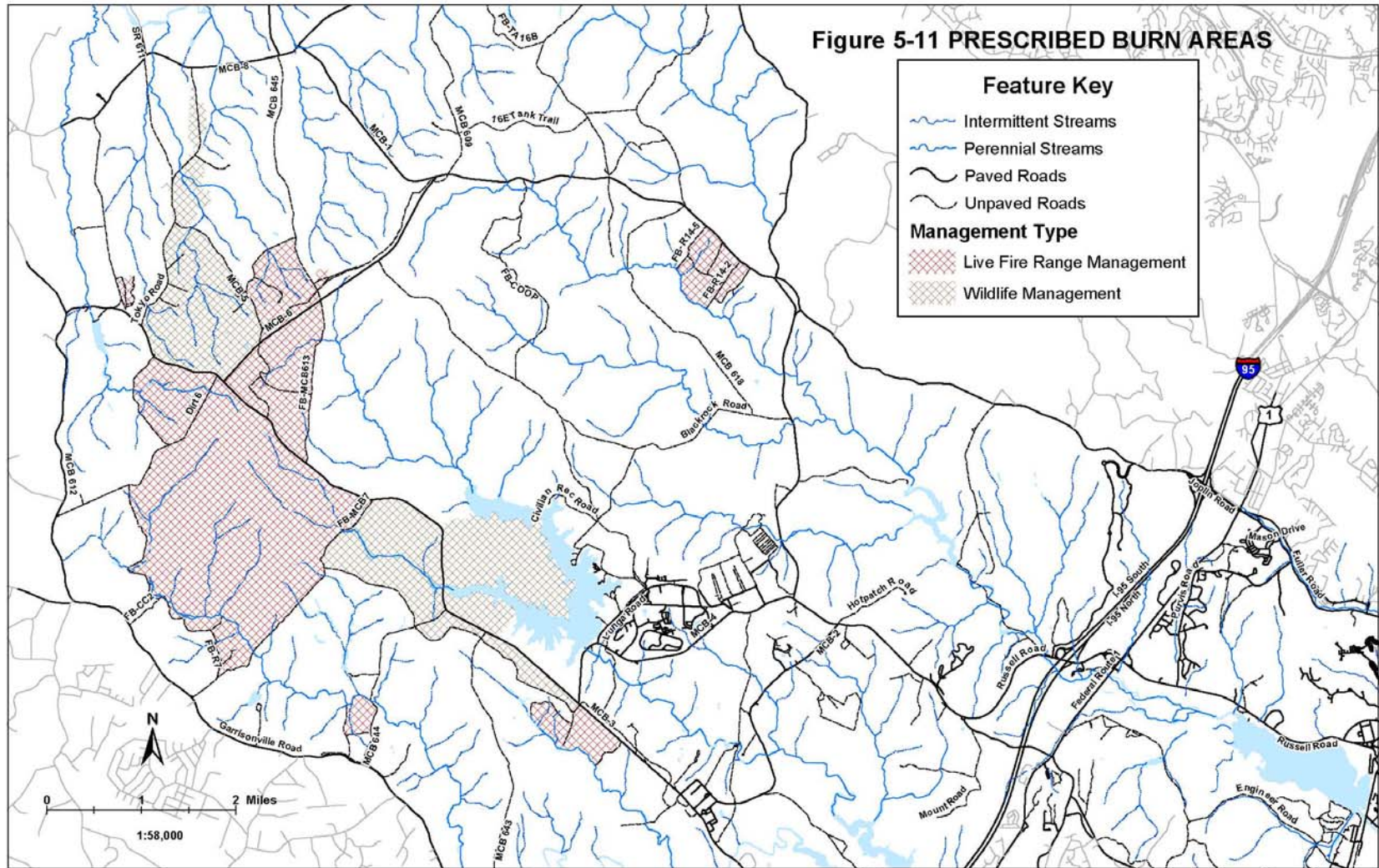


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# INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

## CHAPTER 5

### FOREST RESOURCES

#### SECTION 7: SUMMARY AND PROJECT DESCRIPTIONS

##### 5700. SUMMARY

1. Chapter 5 has provided an assessment of the forest resource and its importance to the training mission. This Chapter has also detailed long-range management concepts, operational goals, and projects necessary to accomplish Goals 6, 7, and 8 of Driver II in this INRMP (see Chapter 1). Forest management projects and actions in support of Drivers I and III are identified in other Chapters of this INRMP.

2. Driver II and Goals 6, 7, and 8 are restated below.

Driver II: To support and enhance the preservation of all animal and plant life endemic to the Base ecosystem with sound management practices that meet the requirements of all applicable Federal, State and local laws and regulations.

Goal 6: To perpetuate a diverse forest environment that fulfills the requirements for military training; sustain the yield of forest products; identify and control potential forest insect and disease problems; maintain healthy forest ecosystems; and provide for diversity of plant and animal species.

Goal 7: To provide for the management and control of wildfires from military training exercises through an aggressive fire management program which; establishes a fire danger classification to assess fire potential; provides for an adequate firebreak system around areas with high fire incidence; provides for safe and effective fire suppression by personnel who are competently trained; and minimizes the likelihood that fires will escape from Base lands to surrounding private property.

Goal 8: To provide for the managed application of fire to meet forest management, wildlife management, fire maintained ecosystem requirements, and reduce the intensity and frequency of fires on open ranges and forested areas with high fire incidence.

3. Projects necessary to accomplish Goals 6, 7, and 8 are detailed in paragraph 5701.

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### 5701. PROJECT DESCRIPTIONS

#### 1. Goal 6

##### a. Priority "A" Projects

(1) Forest Management Planning and Administration. Complete long-range forest management planning requirements of the Integrated Natural Resources Management Plan (INRMP). Develop annual program and budget requirements. Review and update applicable Base Orders and SOP's, requisition resources for forestry projects, complete required forestry program reports, provide personnel with appropriate training, and direct personnel in accomplishment of program objectives. Maintain accountability of receipts from the sale of forest products. Update the INRMP as required.

(2) Complete NEPA Requirements for Forestry Projects. Conduct planning and scoping meetings, complete NEPA documentation (CE or EA) and present before Environmental Impact Review Board (EIRB). Ensure that historic, cultural, and threatened and endangered species surveys are completed.

(3) Review other applicable NEPA projects. Review all NEPA projects that have potential for affecting forest resources. Provide recommendations to mitigate impacts. Support timber removal requirements when possible (through contract logging), and ensure that proper value is received for salable timber.

(4) Evaluate and treat 3-7 forest compartments each year for forest health maintenance.

(a) Forest Compartments 1-35. Conduct annual evaluations of 3-5 forest compartments for forest health maintenance according to the 10-year entry schedule, and implement treatments through timber harvesting and other forest stand improvement methods. Integrate military training and wildlife management requirements into harvesting projects. Maintain spatial distribution of age classes, diversity of forest species, and harvest levels within established sustained yield guidelines. Maintain riparian habitat and streamside management zones to protect water quality. Minimize soil disturbance and erosion.

(b) Forest Compartments 36-65. Accomplish some disbursed harvesting and prescribed burning in 1-2 forest compartments per year to improve forest health conditions, species diversity, wildlife habitat, and reduce wildfire potential. Establish and maintain old

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growth forests and other unique forest ecosystems. Control insect and disease outbreaks promptly to prevent large-scale infestations in these older, less vigorous forest stands.

(5) Road Access Requirements. Complete annual forest management road access improvements six to twelve months prior to advertisement of timber contracts.

(6) Timber Contracts. Complete site layout of units to be treated through timber harvests. Conduct appraisals of units and products to be sold. Complete timber contract and mail out advertisement prospectus. Provide tours of contract area for prospective bidders and conduct sealed bid opening. Schedule contractor access with Range Management Branch, Operations Division. Administer contract for compliance. Maintain current and accurate documentation of contractor activities, progress, and compliance.

(7) Site Preparation and Reforestation. Complete annual site preparation and planting on harvested sites and any open areas requiring regeneration to forest cover. Complete all requirements necessary for contract planting. Complete necessary actions for natural regeneration. Evaluate regeneration through surveys to ensure that stands are adequately stocked with preferred species.

(8) Forest Insects and Disease Management. Monitor Gypsy Moth populations through male moth trapping program, observations and reports of caterpillars and egg masses, and Base aerial reconnaissance flights during peak defoliation periods. Conduct egg mass surveys when population levels warrant, to ensure that suppression efforts will be implemented in time to prevent major defoliations and subsequent tree loss. Monitor southern pine beetle incidence through reports and visual observations, and annual aerial Base reconnaissance flights. Treat infected areas promptly to prevent further spread. Monitor other native and introduced forest insect and disease pests and implement treatments as required.

(9) Natural Damages to Forest Resource. Monitor natural environmental damages to the forest resource such as ice, snow, and winds (often associated with heavy rainfall). Conduct ground surveys and/or reconnaissance flights to determine extent of damage. Implement timely salvage operations before product values deteriorate, and to prevent insects and diseases from spreading to surrounding healthy stands. Although wildfires are not naturally caused at MCB, damages should be evaluated and treated similarly.

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(10) Urban Forest Management. Provide inspections and recommendations for tree removal, fertilization, and pruning; shrub and tree pest management; and landscaping and species selection for developed Base areas.

(11) Fire Management.

(a) Evaluate wildfire suppression program requirements to ensure that fires are controlled quickly, with minimal disruption to military training, and with little chance of escape from Base lands to surrounding private property. Ensure that personnel receive adequate wildfire suppression training, and wear proper protective clothing and equipment. Serve as co-incident commander and resource protection advisor on wildfire incidents. Evaluate firebreak requirements and ensure that they remain functional. Maintain a basic weather station to observe and record weather parameters used in fire danger forecasting. Establish the fire danger classification and report it to Range Management Branch, Operations Division, during periods of active fire danger. Assist the Fire Chief in reviewing and updating Base firefighting Orders. Maintain and replace equipment used in wildfire suppression as required (back pack pumps, truck mounted pump, fire tools, leaf blowers, and bambi buckets).

(b) Coordinate and implement the Base prescribed burning program. Assess fuels in training areas for wildfire hazard potential and incorporate appropriate treatments for fuel reduction through silvicultural treatments and prescribed burning. Prepare an annual prescribed burning plan to meet fire management objectives for forestry, wildlife, ranges and training areas, and all other burning requirements by 1 Feb. Ensure that the plan is implemented.

(12) Maintain Forestry Vehicles and Equipment. Maintain and repair all forestry equipment to ensure that it remains functional for intended lifespan (Ford Explorer, Ford dump truck, Caterpillar bulldozer and trailer, chainsaws, brush cutters, and tools).

(13) Project Costs. A list of project descriptions and costs for all priority "A" projects is provided in Table 5-11.

b. Priority "B" Projects

(1) Equipment Purchase and Replacement. Purchase a bulldozer to replace the old 1988 bulldozer that is currently utilized. This bulldozer is essential for forest management operations. A request was submitted in 2006 for DoD Forestry Reserve Account funding. As yet, funding had not been verified. The request for funding for



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this equipment will be submitted in subsequent years until obtained. Alternative sources of funding may be required.

(2) Forest Management Brochure. Develop a brochure that explains the mission of the forest management program. The pictorial brochure would explain how management actions are designed to maintain forest health in support of the military training mission.

(3) Invasive Species Control in Pine Plantations. Treat invasive species such as Ailanthus, autumn olive, and Japanese knot weed in 1-4 year old pine plantations to prevent further spread. These species are often visible in pine plantations within 1-2 years after planting, and can spread more readily under open conditions. NEPA documentation would be completed prior to implementation.

(4) Label Base Champion Trees. Use metal identification tags to identify Base champion trees. These tags would list the common name and genus and species, as well as champion tree status. This would provide for some degree of protection, and also aid in location.

(5) Project Costs. A list of project descriptions and costs for all priority "B" projects is provided in Table 5-11.

### c. Priority "C" Projects

(1) Plant Additional Vegetation on Arboretum Trails. To add to the beautification of the Arboretum Trails, plant additional species of flowering native shrubs and trees at trailhead kiosks and parking area. This could be accomplished by transplanting from other on-Base locations or purchasing through nurseries.

(2) Develop Additional Educational/Recreational Trails, or Picnic Areas Around Base Champion Trees. Based on requirements, location and suitability, develop additional educational or recreational trails, and/or picnic areas around Base champion trees to improve the quality of life for Marines and civilians at MCB Quantico.

(3) Pre-commercially Thin/Release 20-30 Acres Annually. Utilize pre-commercial thinning to control species composition, release crop trees, and improve growth and vigor in young dense stands. Hardwood regeneration areas would be targeted. This would also improve the suitability of these areas for training.

(4) Project Costs. A list of project descriptions and costs for all priority "C" projects is provided in Table 5-11.

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TABLE 5-11. List of projects, budget and time line for land management programs. Priority (PRTY) "A" projects maintain the existing program. Priority "B" and "C" add additional projects to provide a more comprehensive program.						
DRIVER, GOAL, PROJECT	PRTY	Estimated annual cost in \$1,000 increments				
DRIVER II. To support and enhance the preservation of animal and plant life endemic to the Base ecosystem.		2007	2008	2009	2010	2011
6. Goal: To perpetuate a diverse forest environment that fulfills the requirements for military training; sustain the yield of forest products; identify and control potential forest insect and disease problems; maintain healthy forest ecosystems; and provide for diversity of plant and animal species.						
• Forest management planning and administration.	A	45	47	49.5	51.5	54
• Complete NEPA requirements for forestry projects.	A	16	17	18	19	20
• Review NEPA projects affecting forest resources.	A	20	20	21.5	22.5	23.5
• Evaluate and treat 3-7 compartments per year for forest health maintenance.	A	23.5	25	26.5	28	30
• Complete forest road access improvements.	A	25	25.5	26.5	27.5	29
• Timber sale contract preparation, advertisement, and administration.	A	42	43	44	45	47
• Complete annual site preparation and reforestation requirements.	A	29	30.5	32.5	34	36
• Forest insect and disease management.	A	3.5	3.5	4	4	4
• Monitor natural environmental damages to the forest resource.	A	1	2	1	2	2
• Urban Forest Management.	A	21	22	23	24	25
• Fire Management.	A	29	30.5	32.5	33	33
• Maintain forestry equipment.	A	6	6	6	6.5	6.5
• Equipment replacement (bulldozer).	B	185	0	0	0	0
• Develop a forest management brochure.	B	1	1	0	0	0
• Treat invasive species in new pine plantations.	B	1	1	1	1	1

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## All priority "A" projects to be funded from Forestry H2 funds.

TABLE 5-11. List of projects, budget and time line for land management programs. Priority (PRTY) "A" projects maintain the existing program. Priority "B" and "C" add additional projects to provide a more comprehensive program.						
DRIVER, GOAL, PROJECT	PRTY	Estimated annual cost in \$1,000 increments				
DRIVER II. To support and enhance the preservation of animal and plant life endemic to the Base ecosystem.		2007	2008	2009	2010	2011
• Label Base Champion Trees with identification tags.	B	1	1	1	1	1
• Plant species of native flowering shrubs and trees on Arboretum trailheads and parking areas.	C	1	1	0	0	0
• Develop additional educational/recreational trails, or picnic areas around Base Champion Trees.	C	0	4	2	2	0
• Pre-commercially thin/release 10-20 acres annually.	C	4.5	4.5	4.5	4.5	4.5
<b>Subtotal for "A" projects</b>		261	272	285	297	310
<b>Subtotal for "B" projects</b>		188	3	2	2	2
<b>Subtotal for "C" projects</b>		5.5	9.5	6.5	6.5	4.5
<b>Grand Total</b>		454.5	284.5	293.5	305.5	316.5

Priority "B" and "C" projects to be funded from the following funding sources:

- Forestry H2 funds
- DoD Forestry Reserve Account funds
- FEFV O&MN funds

## 2. Goal 7

Projects and costs for this goal are provided for those aspects of the fire management program for which the Forestry Section has responsibility. Firebreak construction and maintenance are the responsibility of the Facilities & Logistics Services Section (FLSS). FLSS will be responsible for funding these requirements. Other costs not identified, are those incurred by the Fire Department and Range Management Branch for wildfire suppression.

### a. Priority "A" Projects

(1) Fire Danger Classification. The Forestry Section will maintain a basic weather station at Building 27007 (Log Cabin) to observe and record weather parameters used in fire danger

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forecasting. Establish the fire danger classification level and report it to Range Management Branch, Operations Division during periods of active fire danger.

(2) Firebreaks. Continue implementation of the approved firebreak renovation plan for MCB, Quantico. Ensure that firebreak construction is completed. Periodic annual maintenance will be necessary to keep the firebreaks in functional condition. This includes grading, spot gravelling, cleaning ditches, and culverts, and herbicide application to eliminate grasses growing on the firebreak road surface. The Forestry Section will monitor conditions of firebreaks and maintenance requirements to ensure that they remain functional. The Facilities & Logistics Services Section (FLSS) has responsibility for firebreak construction, maintenance, and obtaining funding for this work.

(3) Wildfire Suppression. Fight fires aggressively to ensure protection of life, facilities, and natural and cultural resources; prevent fires from escaping to surrounding private lands; and minimize impacts on military training. Maintain readiness capabilities according to fire danger classification as specified in MCB Order P11320.1. The Head, Forestry Section and Fire Chief, have responsibility for managing wildfire suppression activities. Additionally, Forestry has the responsibility of being the on-scene advisor for natural and cultural resource protection. The Head, Forestry Section will assist the Fire Chief in reviewing and updating those portions of MCBO P11320.1 pertaining to wildfire suppression as required.

(4) Safety. Firefighter and public safety will be the first and foremost priority at all times. Ensure that personnel involved in wildfire suppression wear proper personal injury protection. Observe safety precautions for firefighting, use of hand tools, equipment, and vehicle operation at all times. Stress attentiveness to the "Standard Firefighting Orders" and "Situations That Shout Watch Out". Ensure that effective communications are maintained at all times with all fire suppression personnel working on the incident.

(5) Training. Training in wildfire suppression is available through in-house instruction by Forestry Section and Fire Department personnel, and through training courses taught by the Virginia Department of Forestry, U.S. Forest Service, and other Federal Agencies. Personnel involved in wildfire suppression shall receive

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adequate training and fulfill wildfire suppression responsibilities that are commensurate with their level of training and experience.

(6) Equipment. Maintain fire suppression equipment in operable condition and replace non-functional items. This includes backpack pumps, fire tools, leaf blowers, chainsaws, truck mounted water pump units, and Bambi buckets.

(7) Project Costs. A list of project descriptions and costs for all priority "A" projects is provided in Table 5-12.

### b. Priority "B" Projects

(1) Initiate Programs to Reduce Fuel Loading Near Developed Areas on Base Perimeter. (Subject to availability of other sources of Federal Funding). Determine availability of Federal funding to DoD Installations, under the "Healthy Forests Initiative and Healthy Forests Restoration Act", and other Wildland-Urban Interface Fire Management Programs. Assess conditions, prioritize risk and treatment requirements, and utilize funds to reduce high risk problem areas.

(2) Purchase Field Laptop Computer and Printer. A field laptop computer and printer for use on fire incidents would provide the capability to map the fire perimeter through the use of GPS. The ability to print out an accurate on-site map of the fire's perimeter and location would greatly aid in fire suppression organization and implementing tactical strategies. It would also provide for significantly less confusion if personnel involved in suppression activities are provided with accurate maps.

(3) Develop a Base GIS Fuel Model Coverage. The GIS Fuel Model Coverage would be developed from the existing timber stands coverage database, which also includes open and developed areas.

(4) Develop a Fuel Risk Coverage. From the Fuel Model Coverage developed in (3) above, develop a coverage to establish risk of fire spread potential for various Base fuel types by area.

(5) Project Costs. A list of project descriptions and costs for all priority "B" projects is provided in Table 5-12.

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TABLE 5-12. List of projects, budget and time line for land management programs. Priority (PTY) "A" projects maintain the existing program. Priority "B" and "C" add additional projects to provide a more comprehensive program.						
DRIVER, GOAL, PROJECT	PTY	Estimated annual cost in \$1,000 increments				
DRIVER II. To support and enhance the preservation of animal and plant life endemic to the Base ecosystem.		2007	2008	2009	2010	2011
7. Goal: To provide for the management and control of wildfires from military training through an aggressive fire management program which; establishes a fire danger classification system to assess fire potential; provides for an adequate firebreak system around areas with high fire incidence; provides for safe and effective fire suppression by personnel who are competently trained; & minimizes the likelihood that fires will escape from Base lands to private property.						
• Maintain fire danger classification system.	A	0	1	.5	0	0
• 1Complete MCB firebreak system. Inspect for maintenance needs.	A	FLSS	FLSS	FLSS	FLSS	FLSS
• Maintain wildfire control order & capability for fire suppression.	A	Labor Only	Labor Only	Labor Only	Labor Only	Labor Only
• Serve as co-incident commander and resource protection advisor on wildfire control activities.	A	Labor Only	Labor Only	Labor Only	Labor Only	Labor Only
• Ensure proper safety procedures are followed at all times.	A	Labor Only	Labor Only	Labor Only	Labor Only	Labor Only
• Provide training for NREA fire suppression personnel.	A	2	2	2	2	2
• Maintain and replace fire suppression equipment as required.	A	5	1	2	1	3
• 2Reduce fuel loading near developed Areas on Base perimeter.	B	25	20	0	0	0
• Purchase equipment for real-time field mapping of fire incidents.	B	3	2	0	0	0
• Develop a Base GIS Fuel Model Coverage.	B	10	0	0	0	0
• Develop a Fuel Risk Coverage.	B	0	10	0	0	0
<b>Subtotal for "A" projects</b>		7	4	4.5	3	5
<b>Subtotal for "B" projects</b>		38	32	0	0	0
<b>Grand Total</b>		45	36	4.5	3	5

1Funded by FLSS, 2 Other Agency Funding, other projects funded by FEFV O&MN, funds.

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### 3. Goal 8

#### a. Priority "A" Projects

(1) Prescribed Burning Program. Administer the Base prescribed burning program. Ensure that all prescribed burning is conducted safely and under proper established guidelines and conditions. Complete annual burning on ranges to minimize down time for military training and reduce risk of escaped fires. Complete all other burning requirements for training areas, wildlife and forest management. Ensure that prescribed burning requirements are compatible with fire management objectives. Evaluate all training areas to assess fuel loading and ignition hazards. Incorporate appropriate treatments through prescribed burning and other actions.

(2) Update Base Orders Pertaining to Prescribed Burning. Review MCBO 6240.5A annually. Update portions pertaining to prescribed burning as required to ensure current status.

(3) Prescribed Burning Plan. The Forestry Section will prepare an annual prescribed burning plan by February 1. The prescribed burning plan will provide detailed descriptions of controlled burning requirements for ranges, training areas, forest management, and wildlife management. The plan will also detail all other considerations and requirements such as documentation, safety, equipment, manpower, weather and fuel constraints, smoke management and notification procedures. Implementation of the plan will be coordinated by the Forestry Section.

(4) Procedures and Guidelines. Explicit procedures to be followed for conducting prescribed burns will be detailed in the annual prescribed burning plan. Overall requirements are detailed in paragraph 5602, (3) of this INRMP. Prescribed burning will comply with all guidelines and procedures, Base regulations, and laws governing the Virginia Certified Prescribed Burn Manager Program to ensure that smoke management requirements are addressed and liability for smoke nuisance is minimized.

(5) Proper Protective Equipment and Clothing. Personnel involved in prescribed burning will wear proper protective clothing and equipment. Supervisors will ensure that adequate protective equipment and clothing is available for employees.

(6) Project Costs. A list of projects descriptions and costs for all priority "A" project is provided in Table 5-13.

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TABLE 5-13. List of projects, budget and time line for land management programs. Priority (PTY) "A" projects maintain the existing program. Priority "B" and "C" add additional projects to provide a more comprehensive program.						
DRIVER, GOAL, PROJECT	PTY	Estimated annual cost in \$1,000 increments				
DRIVER II. To support and enhance the preservation of animal and plant life endemic to the Base ecosystem.		2007	2008	2009	2010	2011
8. Goal: To provide for the managed application of fire to meet forest management, wildlife management, fire maintained ecosystem requirements, and reduce the frequency and intensity of fires on open ranges and forested areas with high fire incidence.						
• Coordinate Base prescribed burning program and ensure that proper procedures are followed.	A	*	*	*	*	*
• Provide input for periodic review/update of MCBO 6240.2	A	*	*	*	*	*
• Assess fuel conditions in training areas and implement appropriate actions to manage fuel loading.	A	*	*	*	*	*
• Prepare the annual prescribed burning plan to meet all Base burning requirements by 1 Feb.	A	*	*	*	*	*
• Comply with the Virginia Certified Prescribed Burn Manager Program.	A	*	*	*	*	*
• Ensure that personnel involved in prescribed burning are provided with proper protective equipment and clothing.	A	#	#	#	#	#
<b>Total for "A" projects</b>		—	—	—	—	—

\* Involves labor costs primarily. Costs for these projects are already incorporated into Table 5-11.

# Fire protection equipment and clothing for prescribed burning is the same that is utilized for wildfire suppression. These costs are already incorporated into Tables 5-11 and 5-12.